CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS
TO
THE WATER QUALITY CONTROL PLAN FOR THE SACRAMENTO RIVER AND SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF SALT AND BORON DISCHARGES INTO THE LOWER SAN JOAQUIN RIVER

FINAL STAFF REPORT

10 September 2004

State of California

California Environmental Protection Agency

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

———

Thomas R. Pinkos, Executive Officer

———

11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

———

Phone: (916) 464-3291
CalNet: 8-494-3000

D I S C L A I M E R

This publication is a report by staff of the California Regional Water Quality Control Board, Central Valley Region. This report contains the evaluation of alternatives and technical support for the adoption of an amendment to the Water Quality Control Plan for the Sacramento and San Joaquin River Basins (Resolution No. R5-2004-0108). Mention of specific products does not represent endorsement of those products by the Regional Board.

CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

REGIONAL WATER QUALITY CONTROL BOARD
CENTRAL VALLEY REGION

AMENDMENTS
TO
THE WATER QUALITY CONTROL PLAN FOR
THE SACRAMENTO RIVER AND
SAN JOAQUIN RIVER BASINS

FOR

THE CONTROL OF SALT AND BORON DISCHARGES INTO THE LOWER SAN JOAQUIN RIVER

Final Staff Report
10 September 2004

REPORT PREPARED BY:
Eric I Oppenheimer, Environmental Scientist
Leslie F. Grober, Senior Land and Water Use Analyst

With contributions by:
Wayne Cooley, Associate Engineering Geologist
Harley H. Davis, Staff Environmental Scientist
(now with the Department of Water Resources)
Daniel A. Leva, Water Resources Control Engineer
(now with the San Francisco Bay Regional Water Quality Control Board)
George D. Nichol, Water Resources Control Engineer
(now with the State Water Resources Control Board)
Timothy A. Tadlock, Post Graduate Researcher
Brian Taylor, Associate Engineering Geologist

San Joaquin River TMDL Unit

PREFACE

On 10 September 2004 the Regional Board adopted Resolution No. R5-2004-0108 Amending the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins (Basin Plan), in part, by adopting a Control Program for Salt and Boron Discharges into the Lower San Joaquin River. This staff report has been prepared in conjunction with preparation of the administrative record for this Basin Plan Amendment and incorporates late revisions to the September 2003 *Draft Final* staff report. Following is a summary of the changes made from the September 2003 *Draft Final* staff report. Editorial changes have been made throughout the staff report. Emphasis however, has been placed here on summarizing late revisions to the staff report:

REVISIONS TO THE STAFF REPORT:

Revisions to the proposed Basin Plan Amendment language (pages 10-21 of the Staff Report)

- Item number 4 is modified as follows (underlined text is new):

  "The Regional Board will adopt waste discharge requirements with fixed monthly base load allocations specified as effluent l~~L~~imits for nonpoint source discharges that do not meet conditions specified in a waiver of waste discharge requirements for salinity management. Entities operating under WDRs or that will be required to operate under WDRs in order to comply with other programs, may participate in a Regional Board approved real-time management program if they meet conditions specified in a waiver of WDRs for salinity management, as described in item 3."

  All item numbers after item number 5 of the Control Program for Salt and Boron Discharges into the Lower San Joaquin River are renumbered.

- The second reference to item 11 in item 12, regarding dilution flows, in the Control Program is modified so that the correct item is referenced: item 9 regarding load trading.

- The following text is added to table IV-8 on the bottom of page 18:

  "In addition to the base load allocations or real-time load allocations shown above, a consumptive use allowance (L_{CUA}) is provided to each discharger:

  *L_{CUA} in tons per month = discharge volume in acre-feet per month * 230 µS/cm * 0.8293"*

Changes to Chapter 5: Economics

- The first sentence in the last paragraph of Section 5 (page 89) has been corrected as follows:

  "Though less expensive options may be available, costs to municipal and industrial dischargers are estimated to be approximately $6.3 millions dollars per year if micro-filtration reverse osmosis treatment is used to meet waste load allocations."

Revisions to Appendix 4: Economics

Table D-4 on page 4-8 corrected as follows

Table D-4: Summary of Management Practice Costs and Anticipated Drainage Volume Reduction

Management Practice	Capital Costs	O & M Costs	Drainage Volume Reduction
Surface Drainage Re-circulation	$812/acre-foot	$55/acre-foot/year	~~15%~~ 100%1
Subsurface Drainage Re-circulation	$250/acre-foot	$50/acre-foot/year	~~100%1~~ 15%
Sequential Drainage Re-use	$938/acre-foot	$200/acre-foot/year	47%
Evaporation Ponds	$340/acre-foot	$50/acre-foot/year	100%[2]
Temporary Retention Ponds (re-operation)	$315/acre-foot	$50/acre-foot/year	100%[4]
Real-time Management	$350,000/system[3]	$100,000/system[3]/year	100%[4]
Landfill Disposal Of Salts (cost per ton)	$200/ton	$25/ton	N/A

1-Assumes that 100% of surface drainage can be re-used.
2-100% of all drainage discharged to evaporation ponds will be permanently disposed.
3-11 systems are estimated to be needed to fully implement real-time management
4-100% of all drainage will either be discharged to the LSJR, re-operated, or discharged to evaporation ponds for permanent disposal.

Revision to Municipal and Industrial Cost Estimates

The following corrections were made on page 4-24:

This represents a total annual cost of $599 ~~$549~~ per acre-foot of treated effluent ($259 capital costs plus $340 for O&M) assuming capital costs are amortized over 20 years at 3% interest. The California State Revolving Fund Program (SRF) provides low interest loan funds (3% for 20 yrs) to address water quality problems associated with discharges from wastewater facilities. …

Applying the $599 ~~$549~~ per acre-foot cost to the 7,365 acre-feet wastewater needing treatment (from Table D-10) yields an annual treatment cost of approximately $4.4 ~~$4~~ million dollars per year for MF/RO treatment. …

The total annual cost of the MF/RO treatment needed to meet waste load allocations, including brine disposal costs, is estimated to be approximately $6.3 ~~$6~~ million dollars per year ($1.9 ~~$1.8~~ million dollars per year for the City of Turlock and $4.4 ~~$4.2~~ million dollars per year for the City of Modesto). …

EDITORIAL AND FORMATTING CHANGES

- Other minor changes- A number of other minor editorial and formatting changes have been made throughout the staff report and appendices.

Acknowledgments

We wish to acknowledge the following Regional Board staff for their contribution to this report.

Diane Beaulaurier, Environmental Scientist
Matthew McCarthy, Environmental Scientist
Rudy Schnagl, Senior Environmental Scientist

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

List of Acronyms and Abbreviations

§	Section (as in a law or regulation)
§§	Sections (as in a law or regulation, plural)
Basin Plan	Water Quality Control Plan (Basin Plan) Central Valley Region ; Sacramento River and San Joaquin River Basins
Calwater Group	Interagency California Mapping Committee
CCC	California Coastal Commission
CDFG	California Department of Fish and Game
CEQA	California Environmental Quality Act
CVRWQCB	California Regional Water Quality Control Board, Central Valley Region
CWA	Federal Clean Water Act
DWR	California Department of Water Resources
et seq.	"and following" (references a series of related sections of law)
Ibid.	"ibidem" (same citation or reference as the immediately preceding citation or reference)
JPA	Joint Exercise of Powers Authority
LSJR	Lower San Joaquin River
NHI	Natural Heritage Institute
No.	Number
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
p./ pp.	Page/ pages
pers. comm.	personal communication (either written or oral)
Porter-Cologne or Porter-Cologne Act	Porter-Cologne Water Quality Control Act as amended
PY	Personnel Year
Regional Board	California Regional Water Quality Control Board, Central Valley Region
ROWD	Report of Waste Discharge
RWQCB	Regional Water Quality Control Board
SJR	San Joaquin River
SLDMWA	San Luis & Delta-Mendota Water Authority
State Water Board or SWRCB	California State Water Resources Control Board
TAF	Thousand Acre Feet
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Load
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
Water Code or Wat. Code	California Water Code
WDRs	Waste Discharge Requirements
WQO	Water Quality Objective
WY	Water Year

1 Executive Summary and Background

1.1 Executive Summary

This report provides the technical and policy foundation for a proposed amendment to the water quality control plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. The amendment is intended to implement a Total Maximum Daily Load (TMDL) for Salt and Boron in the Lower San Joaquin River (LSJR). A technical TMDL report has been developed that sets waste load allocations for point sources and load allocations for nonpoint sources. These allocations have been designed to meet existing salt and boron water quality objectives for the LSJR at the Airport Way Bridge near Vernalis. The technical TMDL report for salt and boron in the LSJR is included as Appendix 1.

California Water Code Section 13240 authorizes the Regional Boards to formulate and adopt water quality control plans for all areas within their region. A Basin Plan is the basis for regulatory actions taken for water quality control. The Basin Plan is also used to satisfy parts of Section 303 of the Federal Clean Water Act (CWA) (USEPA, 2002), which requires states to adopt water quality standards. Basin Plans are adopted and amended by the Regional Board through a structured process involving full public participation and state environmental review. Basin Plan amendments do not become effective until approved by the State Water Resources Control Board (State Water Board) and the Office of Administrative Law (OAL). U.S. Environmental Protection Agency (USEPA) approval is required for Basin Plan amendments that affect surface water quality standards. Though this Basin Plan amendment does not propose any changes or modification to the existing water quality standards, it does propose implementation of TMDL, which also requires USEPA approval. A Basin Plan must consist of the following (Water Code Section 13050):

1) beneficial uses to be protected
2) water quality objectives (WQOs)
3) a program of implementation needed for achieving water quality objectives

This proposed Basin Plan amendment focuses on achieving existing salinity and boron water quality objectives for the San Joaquin River at the Airport Way Bridge near Vernalis by establishing a control program for salt and boron discharges to the LSJR. Nonpoint source dischargers can comply with proposed control program by meeting any one of the following conditions:

a. cease discharge to surface waters
b. discharge does not exceed 315µS/cm electrical conductivity
c. operate under waste discharge requirements that include effluent limits for salt
d. operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

Nonpoint source discharges meeting conditions contained in a waiver of waste discharge requirements for salinity management (or specific conditions for salinity management

incorporated into an existing agricultural waiver) will be required to comply with real-time load allocations. Nonpoint source dischargers not meeting these waiver conditions will be required to meet fixed base load allocations.

The fixed base load allocations are designed to protect water quality during low flow conditions. Limiting discharges through fixed load allocations, however, could result in a net salt build-up in the LSJR watershed because salts would continue to be imported to the watershed in supply water but salt exports would be significantly restricted. To overcome this restriction, this control program includes opportunities for dischargers to use real-time allocations to maximize salt exports while still meeting water quality objectives. Real-time load allocations are formulaic, based on actual real-time flow and water quality conditions. Dischargers participating in a Regional Board approved real-time management program would be allowed to use real-time load allocations in lieu of the fixed base load allocations. Real-time load allocations will generally allow more loading to the LSJR than the fixed base load allocations. The benefit of real-time management can be expanded through drainage re-operation. Drainage re-operation involves changing the timing of releases to the LSJR to coincide with periods of assimilative capacity by temporarily storing saline drainage when assimilative capacity is limited, then releasing stored drainage when assimilative capacity becomes available.

The proposed waste load allocations for point source discharges are concentration based and set equal to the existing salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis. The Regional Board will revise NPDES permits to incorporate TMDL allocations when the permits are renewed or reopened at the discretion of the Regional Board.

Waste discharge requirements are proposed for the United States Bureau of Reclamation if, within two years from the effective date of this control program, a Management Agency Agreement (MAA) is not established between the Regional Board and the USBR. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to a) Meet DMC load allocations; or b) Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the SJR equivalent to salt loads in Delta Mendota Canal supply water in excess of their allocation.

Adoption of the proposed Basin Plan amendment will result in the establishment of:

- Fixed load allocations applicable to nonpoint source dischargers regulated under waste discharge requirements
- A method for calculating real-time assimilative capacity and associated real-time salt load limits (available load) based on real-time flow conditions (applicable to dischargers regulated under a waiver of waste discharge requirements or, as appropriate, under new or existing waste discharge requirements when these waste discharge requirements are otherwise required)
- A method for apportioning load allocations to nonpoint source dischargers
- A method for calculating waste load allocations for point source dischargers
- Prioritization, by subarea, for implementing load allocations

- A time schedule, prioritized by subarea, for achieving compliance with waste load allocations and load allocations
- A method for calculating load allocations for salt imported to the LSJR basin by the Delta Mendota Canal of the Central Valley Project.
- A time schedule for establishing upstream salinity water quality objectives, and a TMDL and program of implementation to achieve these objectives

1.2 Need for a Revision to the Basin Plan

In the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary* (Bay Delta Plan), the State Water Board adopted salinity WQOs for the San Joaquin River at the Airport Way Bridge near Vernalis. In 1999, the State Water Board adopted Water Right Decision 1641, which, in part, implements the salinity standards contained in the 1995 Bay Delta Plan. The 1995 (Bay Delta Plan) and Decision 1641 directed the Central Valley Regional Water Quality Control Board to:

1) continue its salt load reduction program, initiated in response to adoption of the 1995 Bay Delta Plan, to reduce annual salt loads to the San Joaquin River by at least 10 percent and to adjust the timing of discharges from low flow to high flow periods

2) promptly develop and adopt salinity objectives and a program of implementation for the main stem of the San Joaquin River upstream of Vernalis

Development of a program of implementation to reduce salt loading and to achieve water quality objectives requires revision of the Basin Plan.

Federal law requires establishment of a TMDL for waters not attaining standards. The lower San Joaquin River is currently identified as not attaining standards for salt and boron, necessitating development of a TMDL. Though other methods may be available, a TMDL with both point and nonpoint sources may, in general, only be established by revising the Basin Plan.

A technical TMDL report for salt and boron in the LSJR was developed in January 2002; it contains all of the required elements of a TMDL, including; (1) a problem statement that describes the water body being addressed and reasons for impairment; (2) numeric targets that set quantifiable end-points that the TMDL seeks to achieve; (3) a source analysis that identifies and describes the significant sources of pollutant loading to the LSJR; (4) loading capacity of the water body; and (5) allocation of loads. An updated version of this TMDL report is included in this staff report as Appendix 1.

1.3 Background

The LSJR is on California's CWA Section 303(d) list of impaired waters due to elevated concentrations of salt and boron. The CWA requires states to develop TMDLs for all impaired waters. Since the 1940s, mean annual salt concentrations in the LSJR at the Airport Way Bridge near Vernalis have doubled and boron levels have increased significantly. Water quality monitoring data collected by the Regional Board and others

indicates that WQOs for salinity and boron are frequently exceeded in the LSJR during certain times of the year and under certain flow regimes. Water quality data collected during water years 1986 to 1998 indicates that the non-irrigation season salinity objective of 1,000 µS/cm (applies 1 Sep.- 31 Mar.), was exceeded 11 percent of the time and the irrigation season salinity objective of 700 µS/cm (applies 1 Apr.- 31 Aug.) was exceeded 49 percent of the time at the Airport Way Bridge Near Vernalis. Consequently, the river does not fully support all of its designated beneficial uses.

The salt and boron water quality impairment in the LSJR has occurred, in large part, as a result of large-scale water development coupled with extensive agricultural land use and associated agricultural discharges in the watershed. LSJR flows have been severely diminished by the construction and operation of dams and diversions and the resulting consumptive use of water. Most of the natural flows from the Upper San Joaquin River (SJR) and its headwaters are diverted at the Friant Dam via the Friant-Kern Canal to irrigate crops outside the SJR Basin. Diverted natural river flows have been replaced with poorer quality (higher salinity) imported water from the Sacramento-San Joaquin Delta (Delta) that is primarily used to irrigate crops on the west side of the LSJR basin. Surface and subsurface agricultural discharges are the largest sources of salt and boron loading to the LSJR; and river water quality is therefore heavily influenced by irrigation return flows during the irrigation season. Water quality generally improves downstream as higher quality flows from the Merced, Tuolumne, and Stanislaus Rivers dilute salt and boron concentrations in the main stem of the LSJR.

1.3.1 Watershed setting

The SJR watershed is bordered by the Sierra Nevada Mountains on the east, the Coast Range on the west, the Delta to the north, and the Tulare Lake Basin to the south. From its source in the Sierra Nevada Mountains, the San Joaquin River flows southwesterly until it reaches Friant Dam. Below Friant Dam, the SJR flows westerly to the center of the San Joaquin Valley near Mendota, where it turns northwesterly to eventually join the Sacramento River in the Delta. The main stem of the entire SJR is about 300 miles long and drains approximately 13,500 square miles.

The major tributaries to the San Joaquin River upstream of the Airport Way Bridge near Vernalis (the boundary of Delta) are on the east side of the San Joaquin Valley, with drainage basins in the Sierra Nevada Mountains. These major east side tributaries are the Stanislaus, Tuolumne, and Merced Rivers. The Consumnes, Mokelumne, and Calaveras Rivers flow into the San Joaquin River downstream of the Airport Way Bridge near Vernalis. Several smaller, ephemeral streams flow into the SJR from the west side of the valley. These streams include Hospital, Ingram, Del Puerto, Orestimba, Panoche, and Los Banos Creeks. All have drainage basins in the Coast Range, flow intermittently, and contribute sparsely to water supplies. Mud Slough (north) and Salt Slough also drain the Grassland Watershed on the west side of San Joaquin Valley. During the irrigation season, surface and subsurface agricultural return flows contribute greatly to these west side creeks and sloughs.

1.3.2 Project Area

The geographic scope of the salt and boron TMDL and this Basin Plan amendment is limited to a 130-mile reach of the SJR extending from downstream of the Mendota Dam to the Airport Way Bridge near Vernalis (Figure 1-1). The LSJR watershed is defined as the area draining to the San Joaquin River downstream of the Mendota Dam and upstream of Vernalis. For basin planning purposes, the LSJR watershed excludes areas upstream of dams on the major Eastside reservoirs: New Don Pedro, New Melones, Lake McClure, and similar Eastside reservoirs in the LSJR system (including all land within Tuolumne and Mariposa Counties). The southeastern boundary of the TMDL project area is formed by the LSJR (from the Friant Dam to the Mendota pool). The LSJR Watershed, as defined here, drains approximately 2.9 million acres, which includes approximately 1.4 million acres of agricultural land use.

More information on the project area is contained in Appendix 1, a Regional Board staff report entitle*d A Total Maximum Daily Load for Salinity and Boron in the Lower San Joaquin River*.

1.4 Organization of the Basin Plan Amendment Staff Report

The Basin Plan Amendment staff report is organized into the following sections. The introduction in Section 1 is followed by proposed changes to the Basin Plan in Section 2. A review of the existing policies that pertain to this Basin Plan amendment are contained in Section 3, and an evaluation of the proposed changes to each of the Basin Plan chapters is contained in Section 4.

Water Code section 13141 requires that prior to implementation of any agricultural water quality control program, an estimate of the total cost of such program and identification of sources of funding be indicated in the Basin Plan. Additionally, Water Code section 13241 requires consideration of economics for adoption of new WQOs. The required economic analysis is included in Appendix 4 and summarized in Section 5.

Since the Basin Plan amendment process is a certified regulatory program pursuant to the California Environmental Quality Act (CEQA), the Basin Plan amendment staff report must serve as a substitute Environmental Document (Environmental Impact Report or Negative Declaration). Accordingly, a CEQA review is contained in Section 6, and a description of public participation is contained in Section 7.

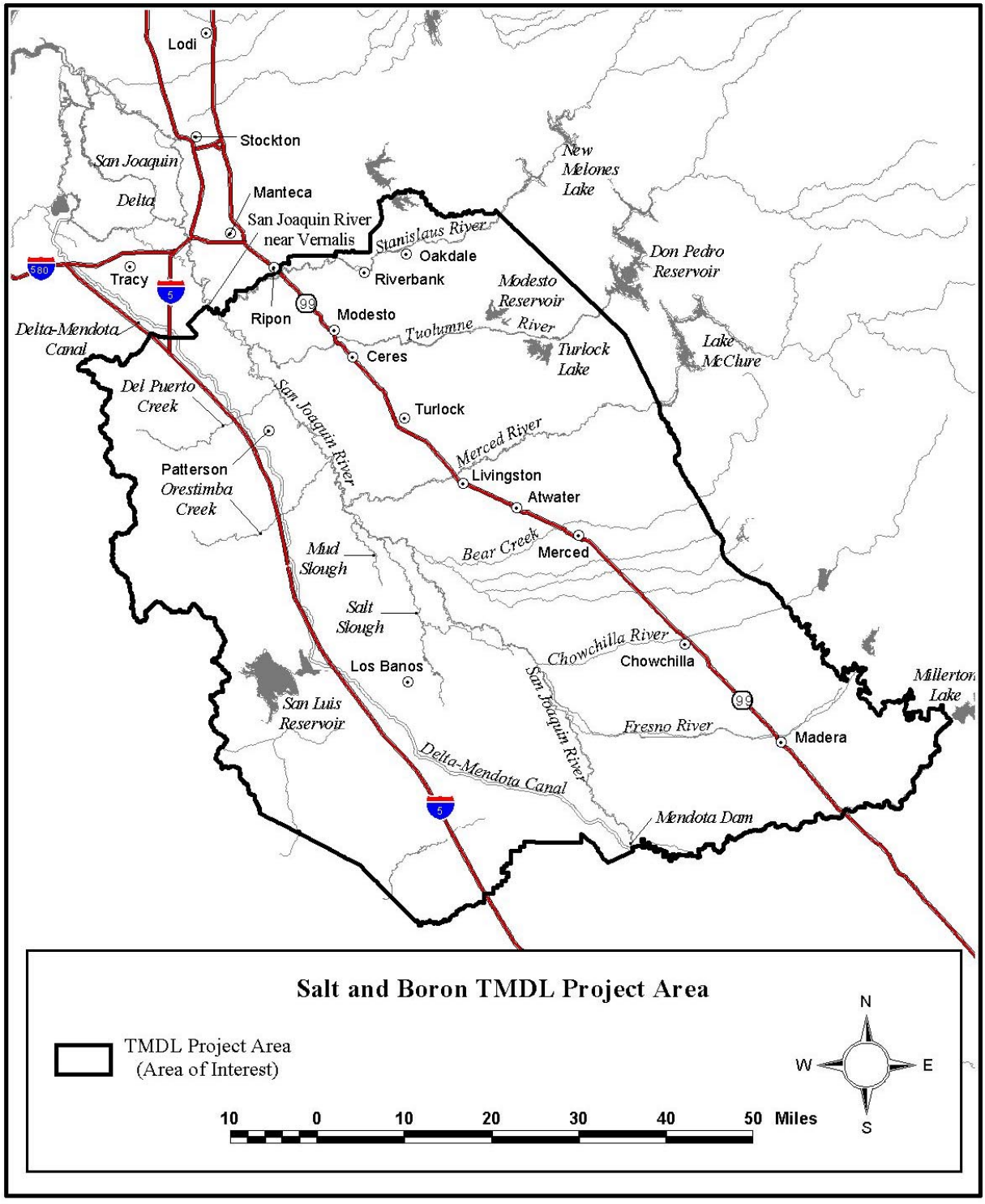


Figure 1-1. Lower San Joaquin River Watershed

2 Proposed Basin Plan Amendment

The proposed Basin Plan amendment consists of additions and modifications to two chapters of the current Basin Plan. Proposed amendment language is contained in Section 2.1 of this staff report. Attachment A contains a draft Regional Board resolution to adopt the proposed Basin Plan amendment. Following is a description of the proposed amendments to the Basin Plan in the order in which they are presented in the Basin Plan.

Proposed Changes to Basin Plan Chapter I: Introduction

Chapter 1 of the Basin Plan contains, among other things, a description of the major basins and their boundaries. This Basin Plan Amendment proposes to:

1) correct an inaccurate description of the planning boundary between the San Joaquin River Basin and the Tulare Lake Basin
2) add a detailed description of the LSJR watershed and descriptions of several smaller geographic subareas within the LSJR watershed

The proposed amendment provides a description of the lower San Joaquin River Basin along with descriptions of several geographic areas within this Basin. These areas are referred to as major subareas (Figure 2-1).

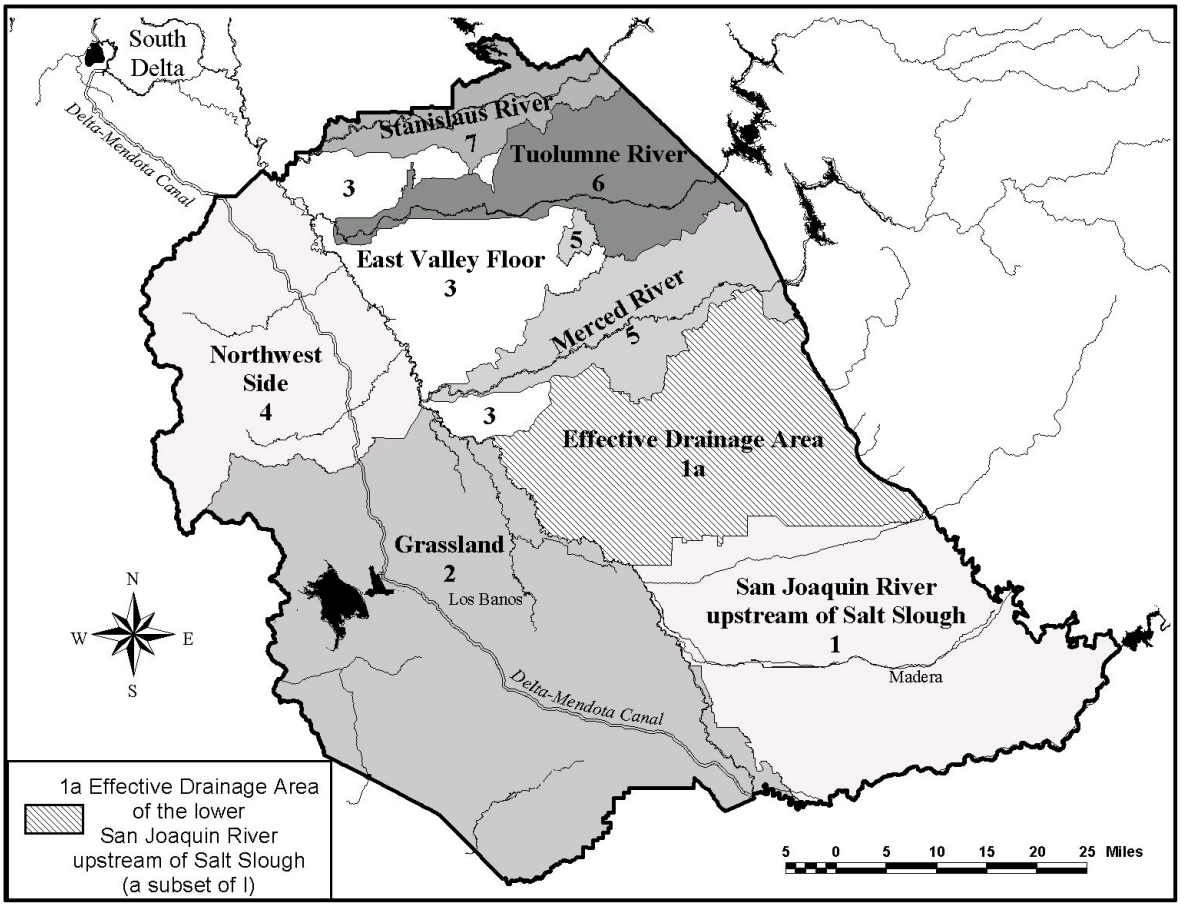


Figure 2-1. LSJR Major Subareas

In some cases, major subareas have been subdivided into minor subareas to allow for increased resolution in identifying pollution sources and increased focus for implementation of regulations and pollution controls. Descriptions of the major and minor subareas listed in Table 2-1 will be added to Chapter 1 of the Basin Plan. Detailed technical description of all subareas are proposed for inclusion in a new appendix to the Basin Plan (Basin Plan Appendix 41, as shown in Appendix 8 of this staff report).

Table 2-1. Lower San Joaquin River Subareas

	Major Subarea		Minor Subarea (subdivisions of major subareas)	
LOWER SAN JOAQUIN RIVER WATERSHED	1	SJR upstream Salt Slough	1a	Bear Creek (effective drainage area)
			1b	Fresno-Chowchilla
	2	Grassland	----------	
	3	East Valley Floor	3a	Northeast Bank
			3b	North Stanislaus
			3c	Stevinson
			3d	Turlock Area
	4	Northwest Side	4a	Greater Orestimba
			4b	Westside Creeks
			4c	Vernalis North
	5	Merced River	----------	
	6	Tuolumne River	----------	
	7	Stanislaus River	----------	

Proposed Changes to Basin Plan Chapter II: Existing and Potential Beneficial Uses

This amendment does not propose any revisions to the beneficial uses.

Proposed Changes to Basin Plan Chapter III: Water Quality Objectives

This amendment does not propose any revisions to the water quality objectives.

Proposed Changes to Basin Plan Chapter IV: Implementation

The amendment proposes to append: 1) recommendations to the State Water Board; and 2) the existing Basin Plan Section titled 'Agricultural Drainage Discharges in the San Joaquin Basin' by adding an additional subsection titled 'Control Program for Salt and Boron Discharges into the Lower San Joaquin River'. The proposed amendment is intended to result in long-term attainment of the existing salt and boron WQOs in the LSJR at the Airport Way Bridge near Vernalis by establishing salinity waste load allocations for point sources and salinity load allocations for nonpoint sources. Compliance with salt load allocations are expected to result in attainment of the existing boron water quality objective at Vernalis, therefore, explicit boron allocations are not needed nor are they proposed.

Nonpoint source dischargers can comply with the proposed control program by meeting any one of the following conditions:

a. cease discharge to surface waters
b. discharge does not exceed 315µS/cm electrical conductivity
c. operate under waste discharge requirements that include effluent limits for salt
d. operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

Nonpoint source dischargers operating under waste discharge requirements are required to meet fixed monthly base load allocations specified as effluent limits and dischargers operating under a waiver of waste discharge requirements are required to participate in a Regional Board approved real-time management program and to meet real-time salt load allocations. The actual fixed monthly base load allocations and the method use to calculate real-time load allocations are specified in Table IV-8 of the proposed Basin Plan Amendment.

Waste load allocations for point source discharges are concentration based and set equal to the existing water quality objectives for the LSJR at the Airport Way Bridge near Vernalis. The proposed amendment includes a method used to prioritize implementation of the control program by geographic subarea and type of discharge. Priorities for implementation are then tied to a schedule for compliance that ranges from 8-12 years for high priority subareas and 16-20 years for low priority subareas.

Waste discharge requirements are proposed for the United States Bureau of Reclamation if, within two years from adoption of this control program, a Management Agency Agreement (MAA) is not established between the Regional Board and the USBR. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to a) Meet DMC load allocations; or b) Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the LSJR equivalent to salt loads in Delta Mendota Canal supply water in excess of their allocation.

A discussion of the costs associated with the proposed salt and boron control program and the potential funding sources will be added to an existing Basin Plan section titled 'Estimated Costs of Agricultural Water Quality Control Programs and Potential Funding Sources'.

Basin Plan Chapter V: Surveillance and monitoring

No revisions to Chapter 5 are proposed

2.1 Proposed Amendments to the Basin Plan

Following are experts from Basin Plan Chapters I and IV shown similar to how they will appear after the proposed amendment is adopted. Deletions are indicated as strike-through text (~~deleted text~~) and additions are shown as underlined text (<u>added text</u>). Italicized text (*Notation Text*) is included to locate where the modifications will be made in the Basin Plan. All other text changes are shown accurately, however, formatting and pagination will change.

Under the Chapter I heading: "Basin Description on page IV-28, make the following changes:

This Basin Plan covers the entire area included in the Sacramento and San Joaquin River drainage basins (see maps in pocket* and Figure II-1). The basins are bound by the crests of the Sierra Nevada on the east and the Coast Range and Klamath Mountains on the west. They extend some 400 miles from the California - Oregon border southward to the headwaters of the San Joaquin River.

*NOTE: The planning boundary between the San Joaquin River Basin and the Tulare Lake Basin follows ~~the northern boundary of Little Panoche Creek basin~~ the southern watershed boundaries of the Little Panoche Creek, Moreno Gulch, and Capita Canyon to boundary of the Westlands Water District. From here, the boundary follows the northern edge of the Westlands Water District until its intersection with the Firebuagh Canal Company's Main Lift Canal. The basin boundary then follows the Main Lift Canal to the Mendota Pool and continues eastward along the channel of the San Joaquin River to Millerton Lake in the Sierra Nevada foothills, and then follows along the southern boundary of the San Joaquin River drainage basin.

The Sacramento River and San Joaquin River Basins cover about one fourth of the total area of the State and over 30% of the State's irrigable land. The Sacramento and San Joaquin Rivers furnish roughly 51% of the State's water supply. Surface water from the two drainage basins meet and form the Delta, which ultimately drains to San Francisco Bay. Two major water projects, the Federal Central Valley Project and the State Water Project, deliver water from the Delta to Southern California, the San Joaquin Valley, Tulare Lake Basin, the San Francisco Bay area, as well as within the Delta boundaries.

The Delta is a maze of river channels and diked islands covering roughly 1,150 square miles, including 78 square miles of water area. The legal boundary of the Delta is described in Section 12220 of the Water Code (also see Figure III-1 of this Basin Plan).

Ground water is defined as subsurface water that occurs beneath the ground surface in fully saturated zones within soils and other geologic formations. Where ground water occurs in a saturated geologic unit that contains sufficient permeability and thickness to yield significant quantities of water to wells or springs, it can be defined as an aquifer (USGS, Water Supply Paper 1988, 1972). A ground water basin is defined as a hydrogeologic unit containing one large aquifer or several connected and interrelated aquifers (Todd, *Groundwater Hydrology*, 1980).
Major ground water basins underlie both valley floors, and there are scattered smaller basins in the foothill areas and mountain valleys. In many parts of the Region, usable ground waters occur outside of these currently identified basins. There are water-bearing geologic units within ground water basins in the Region that do not meet the definition of an aquifer. Therefore, for basin planning and regulatory purposes, the term "ground water" includes all subsurface waters that occur in fully saturated zones and fractures within soils and other geologic formations, whether or not these waters meet the definition of an aquifer or occur within identified ground water basins.

Sacramento River Basin

The Sacramento River Basin covers 27,210 square miles and includes the entire area drained by the Sacramento River. For planning purposes, this includes all watersheds tributary to the Sacramento River that are north of the Consumnes River watershed. It also includes the closed basin of Goose Lake and drainage sub-basins of Cache and Putah Creeks.

The principal streams are the Sacramento River and its larger tributaries: the Pit, Feather, Yuba, Bear, and American Rivers to the east; and Cottonwood, Stony, Cache, and Putah Creeks to the west. Major reservoirs and lakes include Shasta, Oroville, Folsom, Clear Lake, and Lake Berryessa.

DWR Bulletin 118-80 identifies 63 ground water basins in the Sacramento watershed area. The Sacramento Valley floor is divided into 2 ground water basins. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

San Joaquin River Basin

The San Joaquin River Basin covers 15,880 square miles and includes the entire area drained by the San Joaquin River. It includes all watersheds tributary to the San Joaquin River and the Delta south of the

Sacramento River and south of the American River watershed. The southern planning boundary is described in the first paragraph of the previous page.

The principal streams in the basin are the San Joaquin River and its larger tributaries: the Consumnes, Mokelumne, Calaveras, Stanislaus, Tuolumne, Merced, Chowchilla, and Fresno Rivers. Major reservoirs and lakes include Padre, New Hogan, Millerton, McClure, Don Pedro, and New Melones.

DWR Bulletin 118-80 identifies 39 ground water basins in the San Joaquin watershed area. The San Joaquin Valley floor is divided into 15 separate ground water basins, largely based on political considerations. Other basins are in the foothills or mountain valleys. There are areas other than those identified in the DWR Bulletin with ground waters that have beneficial uses.

Grassland Watershed

The Grassland watershed is a valley floor sub-basin of the San Joaquin River Basin. The portion of the watershed for which agricultural subsurface drainage policies and regulations apply covers an area of approximately 370,000 acres, and is bounded on the north by the alluvial fan of Orestimba Creek and by the Tulare Lake Basin to the south. The San Joaquin River forms the eastern boundary and Interstate Highway 5 forms the approximate western boundary. The San Joaquin River forms a wide flood plain in the region of the Grassland watershed.

The hydrology of the watershed has been irreversibly altered due to water projects, and is presently governed by land uses. These uses are primarily managed wetlands and agriculture. The wetlands form important waterfowl habitat for migratory waterfowl using the Pacific Flyway. The alluvial fans of the western and southern portions of the watershed contain salts and selenium, which can be mobilized through irrigation practices, and can impact beneficial uses of surface waters and wetlands if not properly regulated.

Lower San Joaquin River Watershed and Subareas

Technical descriptions of the Lower San Joaquin River (LSJR) and its component subareas are contained in Appendix 41. General descriptions follow: The LSJR watershed encompasses approximately 4,580 square miles in Merced County and portions of Fresno, Madera, San Joaquin, and Stanislaus counties. For planning purposes, the LSJR watershed is defined as the area draining to the San Joaquin River downstream of the Mendota Dam and upstream of the Airport Way Bridge near Vernalis, excluding the areas upstream of dams on the major Eastside reservoirs: New Don Pedro, New Melones, Lake McClure, and similar Eastside reservoirs in the LSJR system. The LSJR watershed excludes all lands within Calaveras, Tuolumne, San Benito, and Mariposa Counties. The LSJR watershed has been subdivided into seven major sub areas. In some cases major subareas have been further subdivided into minor subareas to facilitate more effective and focused water quality planning (Table I-1).

Table I-1 Lower San Joaquin River Subareas

Major Subareas		Minor Subareas	
1	LSJR upstream of Salt Slough	1a	Bear Creek
		1b	Fresno-Chowchilla
2	Grassland	--	--
3	East Valley Floor	3a	Northeast Bank
		3b	North Stanislaus
		3c	Stevinson
		3d	Turlock Area
4	Northwest Side	4a	Greater Orestimba
		4b	Westside Creeks
		4c	Vernalis North
5	Merced River	-	-- --
6	Tuolumne River	-	-- --
7	Stanislaus River	-	-- --

1. Lower San Joaquin River upstream of Salt Slough
This subarea drains approximately 1,480 square miles on the east side of the LSJR upstream of the Salt Slough confluence. The subarea includes the portions of the Bear Creek, Chowchilla River and Fresno River watersheds that are contained within Merced and Madera Counties. The northern boundary of the subarea generally abuts the Merced River Watershed. The western and southern boundaries follow the San Joaquin River from the Lander Avenue Bridge to Friant, except for the lands within the Columbia Canal Company, which are excluded. Columbia Canal Company lands are included in the Grassland Subarea. This subarea is composed of the following drainage areas:

1a. Bear Creek (effective drainage area)
This minor subarea is a 620 square mile subset of lands within the LSJR upstream of Salt Slough Subarea. The Bear Creek Minor Subarea is predominantly comprised of the portion of the Bear Creek Watershed that is contained within Merced County.

1b. Fresno-Chowchilla
The Fresno-Chowchilla Minor Subarea is comprised of approximately 860 square miles of land within the southern portion of the LSJR upstream of Salt Slough Subarea. This minor subarea is located in southeastern Merced County and western Madera County and contains the land area that drains into the LSJR between Sack Dam and the Bear Creek confluence, including the drainages of the Fresno and Chowchilla Rivers.

2. Grassland
The Grassland Subarea drains approximately 1,370 square miles on the west side of the LSJR in portions of Merced, Stanislaus, and Fresno Counties. This subarea includes the Mud Slough, Salt Slough, and Los Banos Creek watersheds. The eastern boundary of this subarea is generally formed by the LSJR between the Merced River confluence and the Mendota Dam. The Grassland Subarea extends across the LSJR, into the east side of the San Joaquin Valley, to include the lands within the Columbia Canal Company. The western boundary of the subarea generally follows the crest of the Coast Range with the exception of lands within San Benito County, which are excluded.

3. East Valley Floor
This subarea includes approximately 413 square miles of land on the east side of the LSJR that drains directly to the LSJR between the Airport Way Bridge near Vernalis and the Salt Slough confluence. The subarea is largely comprised of the land between the major east-side drainages of the Tuolumne, Stanislaus, and Merced Rivers. This subarea lies within central Stanislaus County and north-central Merced County. Numerous drainage canals, including the Harding Drain and natural drainages, drain this subarea. The subarea is comprised of the following minor subareas:

3a. Northeast Bank
This minor subarea of the East Valley Floor contains all of the land draining the east side of the San Joaquin River between the Maze Boulevard Bridge and the Crows Landing Road Bridge, except for the Tuolumne River subarea. The Northeast Bank covers approximately 123 square miles in central Stanislaus County.

3b. North Stanislaus
The North Stanislaus minor subarea is a subset of lands within the East Valley Floor Subarea. This minor subarea drains approximately 68 square miles of land between the Stanislaus and Tuolumne River watersheds that flows into the San Joaquin River between the Airport Way Bridge near Vernalis and the Maze Boulevard Bridge.

3c. Stevinson
This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Merced River confluence and the Lander Avenue (Highway 165) Bridge. The Stevinson Minor Subarea occupies approximately 44 square miles in north-central Merced County.

3d. Turlock Area
This minor subarea of the East Valley Floor contains all of the land draining to the LSJR between the Crows Landing Road Bridge and the Merced River confluence. The Turlock Area Minor Subarea occupies approximately 178 square miles in south-central Stanislaus County and northern Merced County.

4. Northwest Side
This 574 square mile area generally includes the lands on the West side of the LSJR between the Airport Way Bridge near Vernalis and the Newman Waste way confluence. This subarea includes the entire drainage area of Orestimba, Del Puerto, and Hospital/Ingram Creeks. The subarea is primarily located in Western Stanislaus County except for a small area that extends into Merced County near the town of Newman and the Central California Irrigation District Main Canal.

4a. Greater Orestimba
The Greater Orestimba Minor Subarea is a 285 square mile subset of the Northwest Side Subarea located in southwest Stanislaus County and a small portion of western Merced County. It contains the entire Orestimba Creek watershed and the remaining area that drains into the LSJR from the west between the Crows Landing Road Bridge and the confluence of the Merced River, including Little Salad and Crow Creeks.

4b. Westside Creeks
This Minor Subarea is comprised of 277 square miles of the Northwest Side Subarea in western Stanislaus County. It consists of the areas that drain into the west side of the San Joaquin River between Maze Boulevard and Crows Landing Road, including the drainages of Del Puerto, Hospital, and Ingram Creeks.

4c. Vernalis North
The Vernalis North Minor Subarea is a 12 square mile subset of land within the most northern portion of the Northwest Side Subarea. It contains the land draining to the San Joaquin River from the west between the Maze Boulevard Bridge and the Airport Way Bridge near Vernalis.

5. Merced River
This 294 square mile subarea is comprised of the Merced River watershed downstream of the Merced-Mariposa county line and upstream of the River Road Bridge. The Merced River subarea includes a 13-square-mile "island" of land (located between the East Valley Floor and the Tuolumne River Subareas) that is hydrologically connected to the Merced River by the Highline Canal.

6. Tuolumne River
This 294 square mile subarea is comprised of the Tuolumne River watershed downstream of the Stanislaus-Tuolumne county line, including the drainage of Turlock Lake, and upstream of the Shiloh Road Bridge.

7. Stanislaus River
This 157 square mile subarea is comprised of the Stanislaus River watershed downstream of the Stanislaus-Calaveras county line and upstream of Caswell State Park.

Skip to Chapter IV: Implementation

Under the Chapter IV heading: "Recommended for Implementation by the State Water Board" add new sub-heading and items on page IV-28:

Salt and Boron in the Lower San Joaquin River

1. The State Water Board should consider the continued use of its water rights authority to prohibit water transfers if the transfer contributes to low flows and related salinity water quality impairment in the Lower San Joaquin River.
2. The State Water Board should consider the continued conditioning of water rights on the attainment of existing and new water quality objectives for salinity in the Lower San Joaquin River, when these objectives cannot be met through discharge controls alone.

Under the Chapter IV heading: "Continuous Planning For Implementation Of Water Quality Control" and subheading "Agricultural Drainage Discharges in the San Joaquin River Basin" on page IV-30, make the following changes:

Water quality in the San Joaquin River has degraded significantly since the late 1940s. During this period, salt concentrations in the River, near Vernalis, have doubled. Concentrations of boron, selenium, molybdenum and other trace elements have also increased. These increases are primarily due to reservoir development on the east side tributaries and upper basin for agricultural development, the use of poorer quality, higher salinity, Delta water in lieu of San Joaquin River water on west side agricultural lands and drainage from upslope saline soils on the west side of the San Joaquin Valley. Point source discharges to surface waters only contribute a small fraction of the total salt and boron loads in the San Joaquin River.

The water quality degradation in the River was identified in the 1975 Basin Plan and the Lower San Joaquin River was classified as a Water Quality Limited Segment. At that time, it was envisioned that a Valley-wide Drain would be developed and these subsurface drainage water flows would then be discharged outside the Basin, thus improving River water quality. However, present day development is looking more toward a regional solution to the drainage water discharge problem rather than a valley-wide drain.

Because of the need to manage salt and other pollutants in the River, the Regional Water Board began developing a Regional Drainage Water Disposal Plan for the Basin. The development began in FY 87/88 when Basin Plan amendments were considered by the Water Board in FY 88/89. The amendment development process included review of beneficial uses, establishment of water quality objectives, and preparation of a regulatory plan, including a full implementation plan. The regulatory plan emphasized achieving objectives through reductions in drainage volumes and pollutant loads through best management practices and other on-farm methods. ~~Additional regulatory steps will be considered based on achievements of water quality goals and securing of adequate resources.~~

The 88/89 amendment emphasized toxic elements in subsurface drainage discharges. The Regional Water Board however still recognizes salt management as the most serious long-term issue on the San Joaquin River. Salinity impairment in the Lower San Joaquin River remains a persistent problem as salinity water quality objectives continue to be exceeded. The Regional Board adopted the following control program for salt and boron in the Lower San Joaquin River to address salt and boron impairment and to bring the river into compliance with water quality objectives. Additionally, t~~T~~he Regional Water Board will continue as an active

participant in the San Joaquin River Management Program implementation phase, as authorized by AB 3048, to promote salinity management schemes including timed discharge releases, real time monitoring and source control.

Under the Chapter IV heading: "Continuous Planning For Implementation Of Water Quality Control" and after item 16 of the subheading "Agricultural Drainage Discharges in the San Joaquin River Basin" on page IV-32, add the following text:

Control program for Salt and Boron Discharges into the Lower San Joaquin River (LSJR)

The goal of the salt and boron control program is to achieve compliance with salt and boron water quality objectives without restricting the ability of dischargers to export salt out of the San Joaquin River basin.

For the purpose of this control program, nonpoint source land uses include all irrigated lands and nonpoint source discharges are discharges from irrigated lands.

Irrigated lands are lands where water is applied for producing crops and, for the purpose of this control program, includes, but is not limited to, land planted to row, field and tree crops as well as commercial nurseries, nursery stock production, managed wetlands, and rice production.

This control program is phased to allow for implementation of existing water quality objectives, while providing the framework and timeline for implementing future water quality objectives.

The salt and boron control program establishes salt load limits to achieve compliance at the Airport Way Bridge near Vernalis with salt and boron water quality objectives for the LSJR. The Regional Board establishes a method for determining the maximum allowable salt loading to the LSJR. Load allocations are established for nonpoint sources and waste load allocations are established for point sources.

Load allocations to specific dischargers or groups of dischargers are proportionate to the area of nonpoint source land use contributing to the discharge. Control actions that result in salt load reductions will be effective in the control of boron.

The salt and boron control program establishes timelines for: 1) developing and adopting salt and boron water quality objectives for the San Joaquin River upstream of the Airport Way Bridges near Vernalis; 2) a control program to achieve these objectives; and 3) developing and adopting a groundwater control program.

Per the amendment to the Basin Plan for control of salt and boron discharges into the lower San Joaquin River (LSJR) basin, approved by the Regional Board in Resolution No. 2004-0108 and incorporated herein, the Regional Board will take the following actions, as necessary and appropriate, to implement this control program:

1. The Regional Board shall use waivers of waste discharge requirements or waste discharge requirements to apportion load allocations to each of the following seven geographic subareas that comprise the LSJR:

    a. San Joaquin River Upstream of Salt Slough
    b. Grassland
    c. Northwest Side
    d. East Valley Floor
    e. Merced River
    f. Tuolumne River
    g. Stanislaus River

    These subareas are described in Chapter 1 and in more detail in Appendix 41.

2. Dischargers of irrigation return flows from irrigated lands are in compliance with this control program if they meet any of the following conditions:

    a. Cease discharge to surface water

    b. Discharge does not exceed 315µS/cm electrical conductivity (based on a 30-day running average)

    c. Operate under waste discharge requirements that include effluent limits for salt

    d. Operate under a waiver of waste discharge requirements for salt and boron discharges to the LSJR

3. The Regional Board will adopt a waiver of waste discharge requirements for salinity management, or incorporate into an existing agricultural waiver, the conditions required to participate in a Regional Board approved real-time management program. Load allocations for nonpoint source dischargers participating in a Regional Board approved real-time management program are described in table

IV-8. Additional conditions include use of Regional Board approved methods to measure and report flow and electrical conductivity. Participation in a Regional Board approved real-time management program and attainment of salinity and boron water quality objectives will constitute compliance with this control program.

4. The Regional Board will adopt waste discharge requirements with fixed monthly base load allocations specified as effluent limits for nonpoint source discharges that do not meet conditions specified in a waiver of waste discharge requirements for salinity management. Entities operating under WDRs or that will be required to operate under WDRs in order to comply with other programs, may participate in a Regional Board approved real-time management program if they meet conditions specified in a waiver of WDRs for salinity management, as described in item 3.

5. Fixed monthly base load allocations and the method use to calculate real-time load allocations are specified in Table IV-8.

6. Waste Load Allocations are established for point sources of salt in the basin. NPDES permitted discharges will not exceed the salinity water quality objectives established for the LSJR at the Airport Way Bridge near Vernalis. The Regional Board will revise NPDES permits to incorporate TMDL allocations when the permits are renewed or reopened at the discretion of the Regional Board.

7. Supply water credits are established for irrigators that receive supply water from the Delta Mendota Canal (DMC) or the LSJR between the confluence of the Merced River and the Airport Way Bridge near Vernalis as described in Table IV-8.

8. Supply water Load Allocations are established for salts in irrigation water imported to the LSJR Watershed from the Sacramento/San Joaquin River Delta as described in Table IV-8.

   The Regional Board will attempt to enter into a Management Agency Agreement (MAA) with State Water Resources Control Board and the U.S. Bureau of Reclamation to address salt imports from the DMC to the LSJR watershed. The MAA shall include provisions requiring the U.S. Bureau of Reclamation to:

   a. Meet DMC load allocations;or
   b. Provide mitigation and/or dilution flows to create additional assimilative capacity for salt in the LSJR equivalent to DMC salt loads in excess of their allocation

   The Regional Board shall request a report of waste discharge from the U.S. Bureau of Reclamation to address DMC discharges if a MAA is not established within 2 years from the effective date of this control program.

9. The Regional Board will review and update the load allocations and waste load allocations every 6 years from effective date of this control program. Any changes to waste load allocations and/or load allocations can be made through subsequent amendment to this control program. Changes to load allocations will be implemented through revisions of the applicable waste discharge requirements or waivers of waste discharge requirements. Changes to waste load allocations will be implemented through revisions of the applicable NPDES permits.

10. The Regional Board encourages real-time water quality management and pollutant trading of waste load allocations, load allocations, and supply water allocations as a means for attaining salt and boron water quality objectives while maximizing the export of salts out of the LSJR watershed. This control program shall in no way preclude basin-wide stakeholder efforts to attain salinity water quality objectives in the LSJR so long as such efforts are consistent with the control program.

11. The established waste load allocations, load allocations, and supply water allocations represent a maximum allowable level. The Regional Board may take other actions or require additional reductions in salt and boron loading to protect beneficial uses

12. Salt loads in water discharged into the LSJR or its tributaries for the express purpose of providing dilution flow are not subject to load limits described in this control program if the discharge:

    a. complies with salinity water quality objectives for the LSJR at the Airport Way Bridge near Vernalis;
    b. is not a discharge from irrigated lands; and
    c. is not provided as a water supply to be consumptively used upstream of the San Joaquin River at the Airport Way Bridge near Vernalis.

13. Entities providing dilution flows, as described in item 12, will obtain an allocation equal to the salt load assimilative capacity provided by this flow. This dilution flow allocation can be used to:

1) offset salt loads discharged by this entity in excess of any allocation or; 2) trade, as described in item 10. The additional dilution flow allocation provided by dilution flows will be calculated as described in table IV-8.

14. It is anticipated that salinity and boron water quality objectives for the San Joaquin River from Mendota Dam to the Airport Way Bridge near Vernalis will be developed and considered for adoption in the second phase of this TMDL, according to time schedule in Table IV-5.

Table IV-5: Schedule for developing water quality objectives for salt and boron in the LSJR from Mendota Dam to the Airport Way Bridge near Vernalis

Milestone	Date
Staff report on criteria needed to protect beneficial uses	October 2004
Staff report and Regional Board workshop on water quality objectives that can reasonably be achieved	June 2005
Draft second phase TMDL with water quality objectives and program of implementation for LSJR from Mendota Dam to Airport Way Bridge near Vernalis	September 2005
Board Hearing for consideration of adoption	June 2006

15. Salinity and boron water quality objectives for the San Joaquin River from Mendota Dam to the Airport Way Bridge near Vernalis will be implemented using the implementation framework described in this 'Control Program for Salt and Boron Discharges into the Lower San Joaquin River' or other implementation mechanisms, as appropriate.

16. A groundwater control program for sources of salt discharges into the LSJR will be developed by June 2020 if water quality objectives in the LSJR are not being attained.

Implementation Priority

17. The Regional Board will focus control actions on the most significant sources of salt and boron discharges to the LSJR. Priority for implementation of load allocations to control salt and boron discharges will be given to subareas with the greatest unit area salt loading (tons per acre per year) to the LSJR (Table IV-6).

    The priorities established in Table IV-6 will be reviewed every six years from the effective date of this control program.

Table IV-6: Priorities for implementing load allocations[1]

Subarea	Priority
San Joaquin River Upstream of Salt Slough	Low
Grassland	High
Northwest Side	High
East Valley Floor	Low
Merced River	Low
Tuolumne River	Medium
Stanislaus River	Low
Delta Mendota Canal[2]	High

[1] Priorities based on the unit area salt loading from each subarea and mass load from the DMC
[2] Delta Mendota Canal is not a subarea

Time Schedules for Implementation

18. The Regional Board will incorporate base load allocations into waste discharge requirements and real-time load allocations into conditions of waiver of waste discharge requirements within two years of the effective date of this control program. Dischargers regulated under a waiver of waste discharge requirements for dischargers participating in a real-time management program for the control of salt and boron in the LSJR shall comply with the waiver conditions within 1 year of the date of adoption of the waiver.

19. Existing NPDES point source dischargers are low priority and subject to the compliance schedules for low priority discharges in Table IV-6. New point source discharges that begin discharging after the date of the adoption of this control program must meet waste load allocations upon the commencement of the discharge.

Table IV-7: Schedule for Compliance with the load allocations for salt and boron discharges into the LSJR

Priority	Year to implement[1]	
	Wet through Dry Year Types	Critical Year Types
High	8	12
Medium	12	16
Low	16	20

[1] number of years from the effective date of this control program

Table IV-8 Summary of Allocations and Credits

BASE SALT LOAD ALLOCATIONS

Base Load Allocations (thousand tons of salt)

	Month / Period												
Year-type[1]	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	41	84	116	23	72	31	0	0	5	45	98	44	36
Abv. Norm	44	84	64	26	71	14	0	0	0	44	58	35	32
Blw. Norm	22	23	31	11	45	8	0	0	0	38	41	34	30
Dry	28	39	25	5	25	1	0	0	0	25	31	27	28
Critical	18	15	11	0	0	0	0	0	0	19	30	26	23

REAL-TIME SALT LOAD ALLOCATIONS

Nonpoint source dischargers operating under waiver of waste discharge requirements must participate in a Regional Board approved real-time management program and meet real-time load allocations. Loading capacity and real-time load allocations are calculated for a monthly time step. The following method is used to calculate real-time load allocations. Flows are expressed in thousand acre-feet per month and loads are expressed in thousand tons per month.

Loading Capacity (LC) in thousand tons per month is calculated by multiplying flow in thousand acre-ft per month by the salinity water quality objective in µS/cm, a unit conversion factor of 0. 8293, and a coefficient of 0.85 to provide a 15 percent margin of safety to account for any uncertainty.

$$LC = Q * WQO * 0.8293 * 0.85$$

where:
LC = total loading capacity in thousand tons per month
Q = flow in the San Joaquin River at the Airport way Bridge near Vernalis in thousand acre-feet per month
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

The sum of the real-time Load Allocations (LA) for nonpoint source dischargers are equal to a portion of the LSJR's total Loading Capacity (LC) as described by the following equation:

$$LA = LC - L_{BG} - L_{CUA} - L_{GW} - \Sigma WLA$$

Where:
LA = sum of the real-time Load Allocations for nonpoint source dischargers
L_{BG} = loading from background sources
L_{CUA} = consumptive use allowance
L_{GW} = loading from groundwater
ΣWLA = sum of the waste load allocations for all point sources

Background loading in thousand tons is calculated using the following equation:

$$L_{BG} = Q * 85\ \mu S/cm * 0.8293$$

Table IV-8 Summary of Allocations and Credits (continued)

Consumptive use allowance loading is calculated with the following equation:

$L_{CUA} = Q * 230\ \mu S/cm * 0.8293$

Monthly groundwater Loading (L_{GW}) (in thousand tons)

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
15	15	30	32	36	53	46	27	16	13	14	15

Waste load allocations for individual point sources are calculated using the following equation:

$WLA = Q_{PS} * WQO * 0.8293$

where:
WLA = waste load allocation in thousand tons per month
Q_{PS} = effluent flow to surface waters from the NPDES permitted point source discharger (in thousand acre-feet per month)
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

APPORTIONING OF SALT LOAD ALLOCATION

An individual discharger or group of dischargers can calculate their load allocation by multiplying the nonpoint source acreage drained by the load allocation per acre.

$$\text{LA per acre} = \frac{\text{LA}}{\text{Total nonpoint source acreage}}$$

As of 1 August 2003, the total nonpoint source acreage of the LSJR Basin is 1.21-million acres. Nonpoint source land uses include all irrigated agricultural lands (including managed wetlands). Agricultural land includes all areas designated as agricultural or semi-agricultural land uses in the most recent land use surveys published by the California Department of Water Resources. California Department of Water Resources land use surveys are prepared and published on a county-by-county basis. Multiple counties or portions of counties may overlay a given subarea. The land use surveys must be used in combination with a Geographic Information System to quantify the agricultural land use in each subarea. Nonpoint source land areas will be updated every 6 years though an amendment to the Basin Plan if updated California Department of Water Resources land use surveys have been published. The following land use surveys (or portions thereof) are used to quantify agricultural land use in the LSJR watershed.

County	Year of most recent land use survey[1]
Merced	1995
Madera	1995
San Joaquin	1996
Fresno	1994
Stanislaus	1996

[1]-as of 1 August 2003

Acreage of managed wetlands is based on the boundaries of the federal, private and state owned wetlands that comprise the Grassland Ecological Area in Merced County. Agricultural lands (as designated in DWR land uses surveys) within the Grassland Ecological Area are counted as a agricultural land use and not as managed wetlands. All other lands within the Grassland Ecological Area are considered to be managed wetlands.

In addition to the base load allocations or real-time load allocations shown above, a consumptive use allowance (L_{CUA}) is provided to each discharger:

L_{CUA} in tons per month = discharge volume in acre-feet per month * 230 µS/cm * 0.8293

Table IV-8 Summary of Allocations and Credits (continued)

SUPPLY WATER CREDITS

A supply water credit is provided to irrigators in the Grassland and Northwest Side Subareas that receive water from the DMC. This DMC supply water credit is equal to 50 percent of the added salt load, in excess of background, delivered to Grassland and Northwest Side subareas. The following fixed DMC supply water credits apply to dischargers operating under base load allocations:

DMC supply water credits (thousand tons)

Year-type[1]	Month / Period												
	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
NORTHWEST SIDE SUBAREA													
Wet	0.0	0.2	0.0	0.7	1.4	0.7	2.0	2.6	2.6	1.0	0.9	0.6	0.0
Abv. Norm	0.0	0.0	0.0	0.8	1.9	1.0	2.3	2.3	2.6	1.2	0.8	0.3	0.0
Blw. Norm	0.0	0.0	0.0	1.0	2.6	1.5	3.4	4.2	3.3	2.5	1.9	0.8	0.0
Dry	0.0	0.0	0.0	0.1	0.3	0.2	0.3	0.5	0.5	0.2	0.2	0.0	0.0
Critical	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
GRASSLAND SUBAREA													
Wet	2.1	5.9	13.9	7.8	17.3	8.8	22.6	20.8	23.2	17.2	16.0	10.4	3.7
Abv. Norm	1.2	4.8	9.4	10.4	24.7	13.6	27.6	20.3	24.5	23.9	16.6	7.5	2.6
Blw. Norm	1.4	5.7	13.8	12.5	29.5	15.9	32.6	29.2	29.8	32.9	25.3	12.8	4.5
Dry	2.2	6.7	15.9	11.1	23.4	11.2	22.9	23.1	24.0	28.0	23.7	13.0	5.3
Critical	3.3	8.9	17.2	10.2	24.1	13.3	33.3	32.5	31.8	27.5	28.7	13.6	5.9

The following method is used to calculate real-time DMC supply water credits in thousand tons per month and applies to dischargers operating under real-time load allocations.

Real-time CVP Supply Water Credit = Q_{CVP}* (C_{CVP} - C_{BG}) * 0.8293*0.5

Where:
Q_{CVP} = volume of water delivered from CVP in thousand acre-feet per month[3]
C_{CVP} = electrical conductivity of water delivered from CVP in µS/cm[3]
C_{BG} = background electrical conductivity of 85 µS/cm

For irrigators in the Northwest Side Subarea an additional supply water credit is provided to account for salts contained in supply water diverted directly from the LSJR (LSJR diversion water credit). The LSJR diversion credit is equal to 50 percent of the added salt load (in excess of background) in supply water diverted from the San Joaquin River between the confluence of the Merced River and the Airport Way Bridge near Vernalis. The following fixed LSJR supply water credits apply to dischargers operating under base load allocations:

LSJR supply water credits (thousand tons)

Year-type[1]	Month / Period												
	Jan	Feb	Mar	Apr 1 to Apr. 14	Pulse Period [2]	May 16 to May 31	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wet	0.0	0.6	9.2	6.2	9.4	11.0	17.2	23.5	20.5	9.5	1.3	0	0
Abv. Norm	0.0	0.8	5.0	7.4	12.3	11.2	21.8	24.9	20.3	10.7	1.5	0	0
Blw. Norm	0.0	0.6	5.5	7.0	14.4	13.4	27.3	33.1	24.9	13.9	2.4	0	0
Dry	0.0	0.7	5.3	6.4	11.1	10.7	27.5	34.0	20.3	11.4	2.4	0	0
Critical	0.0	0.8	4.5	5.1	14.8	10.6	25.2	28.5	22.3	8.7	2.5	0	0

Table IV-8 Summary of Allocations and Credits (continued)

The following method is used to calculate Real-time LSJR supply water credits in thousand tons per month and applies to dischargers operating under real-time load allocations.

Real-time LSJR Supply Water Credit = $Q_{LSJR\ DIV}$* ($C_{LSJR\ DIV}$-C_{BG}) * 0.8293 * 0.5

Where:
$Q_{LSJR\ DIV}$ = volume of water diverted from LSJR between the Merced River Confluence and the Airport Way Bridge near Vernalis in thousand acre-feet per month[4]
$C_{LSJR\ DIV}$ =electrical conductivity of water diverted from the LSJR in µS/cm[4]
C_{BG} = background electrical conductivity of 85 µS/cm

SUPPLY WATER ALLOCATIONS

The U.S. Bureau of Reclamation DMC load allocation (LA_{DMC}) is equal to the volume of water delivered from the DMC (Q_{DMC}) to the Grassland and Northwest side Subareas at a background Sierra Nevada quality of 85 µS/cm.

LA_{DMC} = Q_{DMC} * 85 µS/cm * 0.8293

DILUTION FLOW ALLOCATIONS

Entities providing dilution flows obtain an allocation equal to the salt load assimilative capacity provided by this flow, calculated as follows:

A_{dil} = Q_{dil}*(C_{dil}-WQO)*0.8293

Where:
A_{dil} = dilution flow allocation in thousand tons of salt per month
Q_{dil} = dilution flow volume in thousand acre-feet per month
C_{dil} = dilution flow electrical conductivity in µS/cm
WQO = salinity water quality objective for the LSJR at Airport Way Bridge near Vernalis in µS/cm

[1] The water year classification will be established using the best available estimate of the 60-20-20 San Joaquin Valley water year hydrologic classification (as defined in Footnote 17 for Table 3 in the State Water Resources Control Board's *Water Quality Control Plan for the San Francisco Bay/Sacramento-San Joaquin Delta Estuary*, May 1995) at the 75% exceedance level using data from the Department of Water Resources Bulletin 120 series. The previous water year's classification will apply until an estimate is made of the current water year.

[2] Pulse period runs from 4/15-5/15. Period and distribution of base load allocation and supply water credits between April 1 and May 31 may change based on scheduling of pulse flow as specified in State Water Board Water Rights Decision 1641. Total base load allocation for April 1 through May 31 does not change but will be redistributed based on any changes in the timing of the pulse period

[3]Methods used to measure and report the volume and electrical conductivity of water delivered from the CVP to irrigated lands must be approved by the Regional Board as part of the waiver conditions required to participate in a Regional Board approved real-time management program

[4] Methods used to measure and report the volume and electrical conductivity of water diverted from the SJR between the confluence of the Merced and the Airport Way Bridge near Vernalis must be approved by the Regional Board as part of the waiver conditions required to participate in a Regional Board approved real-time management program

Under the Chapter IV heading: "Estimated Costs of Agricultural Water Quality Control Programs and Potential Sources of Financing" add new sub-heading and items on page IV-38:

Lower San Joaquin River Salt and Boron Control Program

The estimates of capital and operational costs to implement drainage controls needed to achieve the salt and boron water quality objectives at the Airport Way Bridge near Vernalis range from 27 to 38 million dollars per year (2003 dollars).

Potential funding sources include:

1. Those identified in the San Joaquin River Subsurface Agricultural Drainage Program and the Pesticide Control Program.

2. Annual fees for waste discharge requirements.

In Appendix: add a new Appendix 41 titled "San Joaquin Area Subarea Descriptions"

This proposed language can be found in Appendix 8 of the staff report.

3 Policies

3.1 Review of Existing Policies

Both the State Water Board and the Central Valley Regional Board have a number of existing policies that are potentially applicable to the control of agricultural discharges. These existing policies must be reviewed with respect to their applicability to the subject Basin Plan amendment. The Basin Plan amendment may need to include new policies specific to the control of salt and boron in the LSJR. Any new policies will address either the mitigation of a potential impact or will specify how the program of implementation will be carried out.

3.1.1 Central Valley Regional Board Policies

The following policies have been identified in the Central Valley Regional Board's Basin Plan as being potentially applicable to the control of salt and boron in the LSJR.

Antidegradation Implementation Policy

State Water Board Resolution No 68-16, Statement of Policy with Respect to Maintaining High Quality of Water in California, in applicable part states that:

> *...Implementation of this policy [State Water Board Resolution No. 68-16] to prevent or minimize surface and ground water degradation is a high priority for the Board. ... The prevention of degradation is, therefore, an important strategy to meet the policy's objectives.* (Notation added)
>
> *The Regional Water Board will apply 68-16 in considering whether to allow a certain degree of degradation to occur or remain. In conducting this type of analysis, the Regional Water Board will evaluate the nature of any proposed discharge, existing discharge, or material change therein, that could affect the quality of waters within the region. Any discharge of waste to high quality waters must apply best practicable treatment or control not only to prevent a condition of pollution or nuisance from occurring, but also to maintain the highest water quality possible consistent with the maximum benefit to the people of the State.*
>
> *Pursuant to this policy, a Report of Waste Discharge, or any other similar technical report required by the Board pursuant to Water Code Section 13267, must include information regarding the nature and extent of the discharge and the potential for the discharge to affect surface or ground water quality in the region.*
>
> *This information must be presented as an analysis of the impacts and potential impacts of the discharge on water quality, as measured by background concentrations and applicable water quality objectives. The extent of information necessary will depend on the specific conditions of the discharge. For example, use of best professional judgment and limited available information may be sufficient to determine that ground or surface water will not be degraded. In*

addition, the discharger must identify treatment or control measures to be taken to minimize or prevent water quality degradation.

Evaluation: The proposed Basin Plan amendment does not specifically authorize any new or existing discharges and therefore it is not expected to result in any further degradation of a water body. The proposed Basin Plan amendment is intended to improve an impaired water body by implementing existing water quality objectives through load reductions.

Controllable Factors Policy

The Regional Board's Controllable Factors Policy states that:

Controllable water quality factors are not allowed to cause further degradation of water quality in instances where other factors have already resulted in water quality objectives being exceeded. Controllable water quality factors are those actions, conditions, or circumstances resulting from human activities that may influence the quality of the waters of the State, that are subject to the authority of the State Water Board or Regional Water Board, and that may be reasonably controlled.

Evaluation: The Controllable Factors Policy states that controllable water quality factors cannot cause degradation of water quality when water quality objectives are already being exceeded. The proposed Basin Plan amendment is consistent with the Controllable Factors Policy because the salt and boron TMDL and associated program of implementation seek to bring an impaired water body back into compliance with water quality objectives. No additional controllable discharges are being proposed or are expected as a result of the proposed project. The program of implementation will, in fact, result in further restriction of existing discharges.

The Water Quality Limited Segment Policy

The Regional Boards Water Quality Limited Segment Policy states that:

Additional treatment beyond minimum federal requirements will be imposed on dischargers to Water Quality Limited Segments. Dischargers will be assigned or allocated a maximum allowable load of critical pollutants so that water quality objectives can be met in the segment.

Evaluation: The Water Quality Limited Segment Policy indicates that the Regional Board will assign or allocate a maximum allowable load to dischargers so that water quality objectives can be met. The proposed Basin Plan amendment will establish a control program that allocates available salt and boron loading to point and nonpoint source dischargers. The proposed Basin Plan amendment is, therefore, consistent with the Water Quality Limited Segment Policy.

Watershed Policy

The Regional Board's Watershed Policy states that:

> *The Regional Water Board supports implementing a watershed based approach to addressing water quality problems. The State and Regional Water Boards are in the process of developing a proposal for integrating a watershed approach into the Board's programs. The benefits to implementing a watershed based program would include gaining participation of stakeholders and focusing efforts on the most important problems and those sources contributing most significantly to those problems.*

Evaluation: The proposed Basin Plan amendment is consistent with the Watershed Policy. The technical TMDL report for salt and boron in the LSJR includes a source analysis, which identifies the most significant sources of salt and boron loading to the river. These sources are controlled through waste load allocations and load allocations. The program of implementation for this TMDL has been developed to focus control efforts on the most important sources of pollution. The time schedule for implementation places priority on the most important salt and boron sources. The use of real-time water quality management as an implementation alternative promotes active stakeholder involvement and allows stakeholders to solve water quality problems with a relatively low level of regulation (i.e., waiver of waste discharge requirements).

Policy for Obtaining Salt Balance in the San Joaquin Valley

The Regional Boards Policy for Obtaining Salt Balance in the San Joaquin Valley states that:

> *It's the policy of the Regional Water Board to encourage construction of facilities to convey agricultural drain water from the San Joaquin and the Tulare Basins. A valley-wide conveyance facility for agricultural drain waters impaired by high levels of salt is the only feasible, long-range solution for achieving a salt balance in the Central Valley.*

Evaluation: The proposed Basin Plan amendment is neutral with respect to the Policy for Obtaining Salt Balance in the San Joaquin Valley. The amendment is intended to result in compliance with existing water quality standards. A salt balance is ultimately needed to meet water quality standards over the long-term. Placing limits on saline discharges, however, does not necessarily encourage or discourage the construction of an out-of-valley drain as a method to meet salt and boron load limits.

State Water Board Policies

The State Policy for Water Quality Control

This policy was established by the State Water Board in 1972 and includes general principles for the implementation of "water resources management programs." Key principles that are applicable to this Basin Plan amendment include:[1]

> 1. *Water rights and water quality control decisions must assure protection of available fresh water and marine water resources for maximum beneficial use.*
>
> 2. *Municipal, agricultural, and industrial wastewaters must be considered as a potential integral part of the total available fresh water resource.*
>
> 3. *Coordinated management of water supplies and wastewaters on a regional basis must be promoted to achieve efficient utilization of water…*
>
> 11. *Water quality criteria must be based on the latest scientific findings. Criteria must be continually refined as additional knowledge becomes available.*
>
> 12. *Monitoring programs must be provided to determine the effects of discharges on all beneficial waters uses including effects on aquatic life and its diversity and seasonal fluctuations…*
>
> *Water quality control plans and waste discharge requirements hereafter adopted by the State and Regional Boards under Division 7 of the California Water Code shall conform to this policy…*
>
> *Departures from this policy and water quality control plans adopted by the State Board may be desirable for certain individual cases. Exceptions to the specific provisions may be permitted within the broad framework of well established goals and water quality objectives.*

Evaluation: The proposed Basin Plan amendment includes a program of implementation designed to achieve existing water quality objectives that have been established for salinity and boron in the Lower San Joaquin River at the Airport Way Bridge near Vernalis. These water quality objectives have been established to protect the most sensitive beneficial uses of the LSJR, which include agricultural and municipal supply. The program of implementation for this Basin Plan amendment will be developed to promote the re-use of agricultural drainage and municipal wastewater to reduce salt loading to the LSJR. Increased water use efficiency will be an added benefit of water re-

[1] The numbering is from section II of the policy.

use. This Basin Plan amendment does not propose any new or modified water quality criteria. A separate Basin Plan amendment, however, is concurrently being developed to evaluate the existing salinity and boron water quality objectives and beneficial uses for the LSJR. Any new or modified water quality criteria developed as part of that Basin Plan amendment will be based on the latest scientific findings. The proposed Basin Plan amendment is therefore consistent with the State Policy for Water Quality Control.

Statement of Policy with Respect to Maintaining High Quality of Water in California

The policy (State Water Board Resolution No. 68-16) includes the following statements:

> *1. Whenever the existing quality of water is better than the quality established in policies as of the date on which such policies become effective, such existing high quality will be maintained until it has been demonstrated to the State that any change will be consistent with maximum benefit to the people of the State, will not unreasonably affect present and anticipated beneficial use of such water and will not result in water quality less than that prescribed in the policies.*
>
> *2. Any activity which produces or may produce a waste or increase volume or concentration of waste and which discharges or proposes to discharge to existing high quality waters will be required to meet waste discharge requirements which will result in the best practicable treatment or control of the discharge necessary to assure that (a) a pollution or nuisance will not occur and (b) the highest water quality consistent with maximum benefit to the people of the State will be maintained."*

Evaluation: The Lower SJR is listed on California's 303(d) list as an impaired water body, and the existing water quality in the river is not better than the quality prescribed in the Basin Plan. The proposed Basin Plan amendment is expected to improve salt and boron water quality conditions in the LSJR.

Nonpoint Source Management Plan

In 1988, the State Water Board adopted the first Nonpoint Source Management Plan (Resolution 88-123). An update to that plan, required under the Coastal Zone Act Reauthorization Amendments of 1990, was approved by the USEPA and National Oceanic and Atmospheric Administration in July 2000. The 1988 plan outlines a three-tiered approach to address nonpoint source (NPS) water quality problems.

Tier one, as described in the 2000 update, is "self-determined implementation of management practices." Tier one allows "…landowners and resource managers to develop and implement workable solutions to NPS pollution control and to afford them the opportunity to solve their own problems before more stringent regulatory actions are taken" (SWRCB/CCC, 2000). Tier two is defined as "regulatory-based encouragement of management practices." The two general approaches described for encouraging adoption of management practices is by waiving adoption of WDRs or by entering into Management Agency Agreements with agencies that have authority to enforce best

management practices. Tier three includes the establishment of effluent limitations through WDRs or the application of other Regional Board authorities to bring about compliance with water quality objectives.

Evaluation: The majority of the anthropogenic salt and boron loads to river originate from nonpoint sources of pollution. The proposed Basin Plan amendment must be developed to be consistent with the Nonpoint Source Management Plan. The program of implementation alternatives for this Basin Plan amendment will be evaluated with respect to consistency with the three-tiered approach set forth in the Nonpoint Source Management Plan.

3.1.2 Need for New or Modified Policies

The need for new or revised policies will be evaluated in the remainder of this staff report.

4 Basin Plan Chapters

The purpose of a Basin Plan amendment is to update the Water Quality Control Plan (Basin Plan) with new water quality control actions such as new water quality objectives or, as in this case, an implementation plan for a TMDL. The Basin Plan amendment staff report presents the needed Basin Plan language (revisions, deletions, and/or additions) and information to support these changes. The Basin Plan consists of five chapters:

1) Introduction
2) Existing and Potential Beneficial Uses
3) Water Quality Objectives
4) Implementation
5) Surveillance and Monitoring

Amendments are only proposed for Basin Plan Chapters 1,4, and 5.

4.1 Introduction

The introductory chapter of the Basin Plan contains a description of the planning area and the major hydrologic features of the basin. The Basin Plan area is subdivided into two major watershed delineations: the Sacramento River Basin and the San Joaquin River Basin.

The Basin Plan now includes an inaccurate description of the planning boundary between the San Joaquin Basin and the Tulare Lake Basin. Current Basin Plan language indicates that divide between these two basin is formed by the northern boundary of the Little Panoche Creek Basin. The Little Panoche Creek Basin is, however, contained entirely in the San Joaquin River Basin. Changes are proposed to correct this error. The boundary between the San Joaquin River Basin and the Tulare Lake basins actually follows the natural drainage divide from the crest of the Coast Range along the southern portions of the Little Panoche Creek, Moreno Gulch, and Capita Canyon drainages to boundary of the Westlands Water District. From here, the boundary runs along the northern edge of the Westlands Water District until the intersection with the Firebuagh Canal Company's

Main Lift Canal. The basin boundary then follows the Main Lift Canal to the Mendota Pool and continues eastward along the channel of the San Joaquin River to Millerton Lake in the Sierra Nevada foothills, and then follows along the southern boundary of the San Joaquin River drainage basin.

In 1996 a description of the Grassland Watershed was added to the Basin Plan to implement the existing control program for agricultural subsurface drainage discharges. Similarly, additional sub-watershed delineations (subareas) need to be added to the Basin Plan to facilitate implementation of the proposed control program. The LSJR watershed will be divided into seven major geographic subareas. The Grassland Subarea will replace the existing description of the Grassland Watershed. In some cases, major subareas have been further subdivided into minor subareas (Table 2-1). The addition of these subareas will allow implementation efforts to be prioritized on the most important sources of pollution by applying different compliance time schedules to different subareas. Other water quality control programs will also use the new subareas.

4.2 Beneficial Uses

This Basin Plan amendment does not propose any changes to the designated beneficial uses contained in Basin Plan. The exiting beneficial uses of the San Joaquin River are listed in Table 4-1.

Table 4-1. Existing Site-specific Beneficial Uses of the San Joaquin River

	MUN	AGR		PROC	REC-1		REC-2	WARM	COLD	MIGR		SPWN		WILD
LOWER SAN JOAQUIN RIVER REACH	MUNICIPAL AND DOMESTIC SUPPLY	IRRIGATION	STOCK WATERING	INDUSTRIAL PROCESS	CONTACT	CANOEING AND RAFTING	OTHER NONCONTACT	FRESHWATER HABITAT-WARM	FRESHWATER HABITAT-COLD	WARM	COLD	WARM	COLD	WILDLIFE HABITAT
MENDOTA DAM TO SACK DAM	P	E	E	E	E	E	E	E		E	E	E	P	E
SACK DAM TO MERCED RIVER	P	E	E	E	E	E	E	E		E	E	E	P	E
MERCED RIVER TO VERNALIS	P	E	E	E	E	E	E	E		E	E	E		E
E=EXISTING P=POTENTIAL														
Source: Water Quality Control Plan for the Sacramento and San Joaquin River Basins, Fourth Edition														

4.3 Water Quality Objectives

The State Water Board's Bay Delta Plan contains salinity water quality objectives for the surface waters relevant to the proposed control program. Additionally, the Regional Board's Basin Plan contains numeric boron water quality objectives for the San Joaquin River (Table 4-2). The proposed Basin Plan amendment is intended to result in attainment of the existing water quality objectives that apply to the LSJR at the Airport Way Bridge near Vernalis. No changes to existing water quality objectives are proposed as part of this Basin Plan amendment.

Table 4-2. Salinity and Boron objectives for the lower San Joaquin River at Vernalis

SALINITY		
Reach	**Irrigation Season (Apr1-Aug31)**	**Non-Irrigation Season (Sep1 –Mar 31)**
Vernalis Only	700 µS/cm (30-day running avg.)	1000 µS/cm (30-day running avg.)
BORON		
Reach	**Irrigation Season (Mar 15-Sep15)**	**Non-Irrigation Season (Sep16-Mar14)**
Sack Dam to Merced River	2.0 mg/L (max.) 0.8 mg/L (monthly mean)	5.8 mg/L (max.) 2.0 mg/L (monthly mean)
Merced River to Vernalis	2.0 mg/L (max.) 0.8 mg/L (monthly mean)	2.6 mg/L (max.) 1.0 mg/L (monthly mean) 1.3 mg/L (monthly mean)*

* Critical year relaxation value

4.4 Program of Implementation

Current USEPA regulations do not require TMDLs to include implementation plans. "*Federal Law states that TMDL, upon EPA approval, be incorporated into the state's water quality management plan. California's water quality management plan consists of the Regional Board's basin plans and statewide water quality control plans. State Law, in turn, requires that basin plans have a program of implementation to achieve water quality objectives"* (Written com., Attwater, 1999). California Water Code Section 13242 states that the program of implementation for achieving water quality objectives shall include, but not be limited to:

1) A description of the nature of actions which are necessary to achieve the objectives, including recommendations for appropriate action by any entity, public or private

2) A time schedule for the actions to be taken

3) A description of surveillance to be undertaken to determine compliance with objectives

The purpose of the implementation program is to specify the steps the Board will take to implement the salt and boron TMDL thereby obtaining compliance with existing water quality objectives. Salt and boron levels in the LSJR already exceed concentrations that impact the identified beneficial uses and therefore the Board's control program must involve reductions in the amount of these constituents discharged. This program will apply to all surface water discharges (other than stormwater runoff) from the LSJR watershed.

This section includes: 1) a description of the loading capacity and water quality goals for salt and boron in the LSJR; 2) a discussion of the physical implementation practices that are available for controlling salt and boron; 3) a description the agencies, entities or

dischargers with the responsibility or ability to implement salt and boron controls; 4) a description of the criteria that will be used to evaluate the salt and boron implementation options; and 5) a description of the regulatory and non-regulatory mechanisms available to the Regional Board to implement the salt and boron TMDL. The best available implementation options are identified through an evaluation process and these selected options are used to develop a series of alternatives. Finally, the alternatives are evaluated in Section 4.4.7 and the preferred program of implementation alternative is recommended. Some terminology used in the chapter is described below to assist the reader.

Implementation practices: Operational and physical practices used by dischargers (e.g., growers, municipalities, and wetland operators) to control salt and boron discharges to the San Joaquin River.

Implementation options: Regulatory and non-regulatory controls used by the Regional Board or its designee(s) to control salt and boron discharges to the LSJR.

Alternatives: A combination of the best available implementation options to be used as a comprehensive program of implementation for controlling salt and boron to the San Joaquin River.

4.4.1 Loading Capacity and Interim Water Quality Goals

Section 303(d)(1)(C) of the Clean Water Act requires the establishment of the Total Maximum Daily Load (TMDL) for waters identified on the 303(d) list, if the USEPA Administrator has determined that the pollutant is suitable for a TMDL calculation. The TMDL must be "…established at a level necessary to implement the applicable water quality standards with seasonal variations and a margin of safety which takes into account any lack of knowledge concerning the relationship between effluent limitations and water quality."

Federal regulations provide further definition of the structure and content of TMDLs. TMDLs shall "… take into account critical conditions for stream flow, loading, and water quality parameters" (40 CFR § 130.7(c)(1)).

TMDLs are defined as the sum of the individual waste load allocations (WLAs) and load allocations (LAs). TMDLs can be expressed in terms of "… mass per time, toxicity, or other appropriate measure." WLAs are the portion of the receiving water's loading capacity allocated to existing or future point sources and LAs are the portion of the receiving water's loading capacity allocated to existing or future nonpoint sources of pollution or to natural background sources. The loading capacity is the greatest amount of loading a water can receive without violating water quality standards (40 CFR § 130.2 (f), (g), (h), (i)).

The details of the TMDL calculations and methodology can be found in Appendix 1. The remainder of this section provides a summary of the TMDL for salt and boron in the LSJR.

Phased Approach

The salt and boron TMDL uses a phased approach because new or revised water quality objectives for salinity and boron may be established as part of another Basin Plan amendment that is concurrently being developed. The waste load allocations and load allocations presented in this TMDL are designed to meet salinity and boron water quality objectives in the LSJR at the Airport Way Bridge near Vernalis. These waste load allocations and load allocations may therefore need to be revised to reflect any new or revised water quality objectives. Accordingly, the methods used in the salt and boron TMDL to develop allocations will be applied, as appropriate, to calculate load allocations based upon new or revised water quality objectives. New water quality objectives for the SJR upstream of the Airport Way Bridge near Vernalis, allocations, and a modified implementation framework, as appropriate, will be proposed in the second phase of this TMDL. At current levels of funding and staffing, it is anticipated that a Basin Plan Amendment to adopt new water quality objectives, a revised TMDL, and program of implementation will be ready for consideration of adoption by the Regional Board by June 2006.

A groundwater control program, as described in section 4.5.2, will be developed in a subsequent phase of this TMDL if salinity objectives in the LSJR are not being attained through control of surface water discharges.

Waste Load Allocations

Salt waste load allocations are proposed for the City of Turlock and the City of Modesto wastewater treatment plants, the two major point sources that discharge directly to the LSJR. The waste load allocations are concentration limits set equal to the electrical conductivity WQOs for the LSJR at the Airport Way Bridge near Vernalis. The waste load allocations should not be applied in a manner that will raise either mass load or concentration based effluent limits for salinity (i.e., EC, TDS) that have already been established in existing NPDES permits that apply in the LSJR watershed. The waste load allocations should be used as an upper limit in setting effluent limits for future NPDES permits, recognizing that site-specific conditions may warrant lower salinity limits.

Load Allocations

The SJR salinity problem is not conducive to establishment solely of inflexible fixed or seasonal monthly load allocations for nonpoint sources. Consideration of the following factors necessitated use of a more complicated, formulaic TMDL:

- Salt and boron occur naturally in soils within the TMDL project area and these salts are readily evapoconcentrated through sequential re-use and consumptive use of water.

- Significant salt loads are delivered to the basin from outside sources which restrict the ability of nonpoint source dischargers to comply with discharge load limits.

- Strict adherence to fixed load allocations would restrict the ability to export salt from the LSJR basin such that there would be a net salt buildup in the watershed and long-term degradation of ground and surface waters.

Base Load Allocation

Simple, fixed base load allocations for nonpoint source discharges from seven geographic subareas have been established by calculating the available assimilative capacity of the LSJR at the Airport Way Bridge near Vernalis for the lowest anticipated flow conditions. The base load allocation calculation method uses an operations model to identify low flow conditions for a 73-year historical flow record, sorted by water-year type and month. Waste load allocations, background salt loading, and groundwater salt loading are subtracted from the total loading capacity to determine the salt load that can be allocated to nonpoint sources. The nonpoint source load allocation is apportioned into base load allocations for the seven geographic subareas. The base load allocation considers the seasonal variability of flows in the LSJR and includes an implicit margin of safety since the allocations are based upon the lowest flow conditions anticipated in the LSJR for each month and water year type.

Consumptive Use Allocation

Each subarea is also provided a consumptive use allocation that allows for unlimited discharge of relatively high quality water. Through addition of this consumptive use allocation to all dischargers, this TMDL recognizes the need to provide a base salt load allocation to account for evapoconcentration of salts in a high quality supply water and opportunity for discharging relatively high quality water. Discussion of the consumptive use allocation is provided in Section 4.1 of the Technical TMDL report (Appendix 1)

Supply Water Credits and USBR Load Allocations

Additional load allocations have been provided to the Grasslands and Northwest Side Subareas to account for the local impact of degraded Central Valley Project (CVP) and surface water supplies delivered to these subareas. This additional salt load allocation is offset by establishing load allocations (limits) for the CVP. In effect, responsibility is placed on the U.S. Bureau of Reclamation (USBR) for salt loads in CVP water delivered to the TMDL project area that is in excess of a base load for an equivalent volume of Sierra Nevada quality water.

Real-time Load Allocations

The base load allocations are very conservative because they have been designed to meet water quality objectives during critically low flow conditions (design flows). This TMDL recognizes that strict adherence to these base load allocations would restrict the ability to export salt from the LSJR basin, likely resulting in a net salt buildup in the watershed and long-term degradation of ground and surface waters. To overcome this restriction, the TMDL provides for an additional real-time load allocation. The real-time load allocation can be used in lieu of the fixed base load allocation to maximize salt export from the LSJR basin while still meeting water quality objectives. Real-time load allocations provide greater load allocation to dischargers whenever actual flow in the LSJR exceeds the pre-determined design flow. The use of real-time management will therefore provide

dischargers with increased opportunity to discharge and help to achieve a salt balance in the LSJR watershed by maximizing salt exports.

Real-time load allocations are based on real-time flow and water quality conditions and on a weekly or monthly forecast of assimilative capacity. Since real-time flow and water quality conditions are not known ahead of time, the real-time load allocations must be formulaic. A coordinated effort is therefore needed to forecast assimilative capacity and allocate the available loading capacity (real-time load allocation) to dischargers. Monitoring and modeling is needed to predict short-term assimilative capacity and to meter out discharges to the LSJR in a manner that will not cause water quality exceedances.

The benefit of real-time management can be expanded through drainage re-operation. Drainage re-operation involves changing the timing of releases to the LSJR to coincide with periods of assimilative capacity by temporarily storing saline drainage when assimilative capacity is limited then releasing stored drainage when assimilative capacity becomes available. Drainage re-operation could reduce the burden on dischargers by reducing the amount of drainage that needs to be permanently treated or stored. The use of real-time load allocations, with or without a drainage re-operation component, will require development of significant structural and organizational infrastructure. To ensure that the water quality objectives are met, development of an acceptable real-time management program is a prerequisite to use of real-time load allocations.

Boron allocations

No explicit boron waste load allocations or load allocations are needed to meet boron objectives for the LSJR near Vernalis. The TMDL for salt and boron in the LSJR (Appendix 1) shows that compliance with the established salt load allocations will result in corollary attainment of boron objectives. The TMDL linkage analysis indicates that the boron water quality objectives for the LSJR at the Airport Way Bridge near Vernalis would be exceeded approximately one percent of the time with the TMDL in effect.

A summary of the allocations and credits is presented in Table IV-8 in the proposed Basin Plan Amendment language Section 2.1.

4.4.2 Available Practices and Technology

There is no single set of implementation practices or technology that will ensure that the water quality objectives for salt and boron will be met. Salt and boron water quality improvement in the LSJR can be achieved through one or more of the following methods:

1) Reducing salt and boron loads imported to the LSJR watershed in supply water
2) Increasing the assimilative capacity of the LSJR by providing dilution flow
3) Reducing salt and boron loading from point and/or nonpoint sources
4) Increasing the amount of salt exported from the LSJR watershed, including through re-operation of drainage and real-time water quality management or through the use of an out-of-valley drain

Technical groups for the San Joaquin Valley Drainage Program, CALFED and other efforts investigating the salinity problem have identified a number of practices that may be effective in reducing salt levels in the river. These practices are summarized in Appendix 2. Salinity management practices must be site-specific because the salt generating capacity and drainage needs vary throughout the LSJR watershed due to differences in soils, supply water quality, and drainage and irrigation technology.

4.4.3 Agencies or Entities Responsible for Implementing Salinity Controls

Although the Regional Board could implement the TMDL entirely through its regulatory authority, implementation of load allocations alone will not ensure that water quality objectives will be achieved, as uncontrollable discharges (e.g., groundwater accretions) may still cause water quality exceedances during certain flow regimes. The Board must therefore evaluate and eventually implement a combination of actions and approaches that involve working with the State Water Board, the USBR, and public water agencies (local water districts) to ensure that the salt and boron water quality objectives are achieved. This section describes the agencies that have the ability to affect salt and boron concentrations in the LSJR either through their authority to regulate discharges, authority over water rights, as water suppliers, or as resource management agencies.

State Water Resources Control Board and Regional Board Water Quality Control Board

The USEPA has designated the State Water Board as the state water pollution control agency with the authority to implement the Clean Water Act in California. The Porter-Cologne Water Quality Control Act (Division 7 of the California Water Code) is the principal law governing water quality regulation in California. The Porter-Cologne Water Quality Control Act established the State Water Resources Control Board and the nine Regional Water Quality Control Boards as state agencies having primary responsibility for regulating water quality in California.

The Central Valley Regional Water Quality Control Board (Regional Board) will be the primary agency responsible for implementing the salt and boron control program. The Regional Board will establish waste load allocations for point source discharges and load allocations for nonpoint sources discharges through the TMDL process. Portions of the TMDL, as well as a program of implementation, will be codified in the Basin Plan. The Board will use its regulatory authority, as specified in this program of implementation, to ensure that point and nonpoint dischargers comply with applicable waste load allocations and load allocations.

An important difference between the State Water Board and the Regional Boards is that the State Water Board has authority over water rights; the Regional Boards do not. Water quality and water rights are inextricably linked in the San Joaquin River system. Hydro-modification has had a profound effect on water quality. As more water is consumptively used, less water is available to assimilate pollutants. Agricultural water conservation could reduce pollutant loading from return flows back to the river potentially making water available for other beneficial uses. Conversely, such increased efficiency may

reduce the assimilative capacity of the San Joaquin River by reducing the quantity of higher quality return flows or through transfers of "saved" water to out of basin users. The Regional Board must therefore work closely with the State Water Board Division of Water Rights to ensure that water conservation and associated water transfers are conducted in a manner that considers and protects water quality in the San Joaquin River. The State Water Board can condition water rights permits to include provisions to protect fish and wildlife or other resources such as water quality. In this capacity, the State Water Board should continue to use its water rights authority to implement the existing salinity water quality objectives contained the 1995 Bay Delta Plan or any new water quality objectives proposed by the Regional Board.

Per the State Water Board's Water Rights Decision 1641, it will be recommended as part of this salinity control program that the State Water Board continue to condition the USBR's water rights to require that the USBR meet the 1995 Bay Delta Plan salinity objectives at Vernalis. Additionally, it will be recommended that these and other water rights be conditioned upon attaining salinity objectives in the LSJR upstream of the Airport Way Bridge near Vernalis, as the Regional Board adopts these objectives. It will also be recommended that the State Water Board consider use of its water rights authority to prohibit water transfers, if the transfer contributes to low flows and related salinity water quality impairment in the Lower San Joaquin River.

United States Bureau of Reclamation (USBR)

The 1902 National Reclamation Act established the USBR. This act authorizes the Secretary of the Interior to develop irrigation and hydropower projects in California and 16 other Western States. The Central Valley Project (CVP) is a major federally funded water development project operated by the USBR in California. Major CVP facilities in the San Joaquin River watershed include Friant Dam and Millerton Reservoir, the Madera and Friant-Kern canals (which deliver Millerton Reservoir water to the north and out of basin to the South), the Tracy pumping plant, and the DMC (which conveys Delta water from the Tracy pumping plant to the western San Joaquin Valley).

Operation of the CVP has had a dramatic effect on LSJR flow and water quality by diverting most of the natural San Joaquin River flow out of the San Joaquin River watershed in combination with importing large volumes of water from the Delta to the LSJR watershed. Reduced water flows have seasonally reduced the assimilative capacity of the LSJR and imported "replacement" water has a salt content that is significantly higher than that of the natural river. CVP water imports to the LSJR account for almost half of the mean annual salt load discharged from the LSJR at the Airport Way Bridge near Vernalis (Appendix 1).
The State Water Board's Water Rights Decision 1641 found that the "*actions of the CVP are the principal causes of salinity concentrations exceeding water quality objectives at Vernalis.*" Consequently, the State Water Board amended the permits under which the USBR delivers water to the San Joaquin River Basin to require that the USBR meet the 1995 Bay Delta Plan salinity objectives at Vernalis.

The salt and boron TMDL also recognizes the USBR's role in impairing the LSJR water quality by placing load allocations on the USBR for CVP deliveries. In effect, the USBR will be responsible for meeting these load allocations by providing mitigation in the LSJR watershed. Mitigation could include, but is not limited to, providing additional flows to assimilate loads in excess of CVP load allocations and working with other dischargers to reduce salt loading from agricultural returns. Additionally, the USBR could alleviate its excess load burden through implementation of real-time management of saline discharges. Under this approach the USBR could obtain load credits for salt loads that are retained during periods of no assimilative capacity, followed by future release of retained salts when assimilative capacity is available.

In 2000, the Ninth Circuit Court of Appeals directed the USBR to promptly provide drainage to the San Luis Unit (which includes portions of the LSJR Watershed). The USBR is currently evaluating options to fulfill this mandate through its San Luis Unit Feature Re-evaluation Project. If the project were executed, the USBR would provide drainage to the majority of tile-drained lands in the Grassland Subarea. The USBR is evaluating three primary options to provide drainage to the San Luis Unit including : 1) In-Valley Disposal; 2) Ocean Disposal; and 3) Delta Disposal. All three options would result in removal or isolation of the majority of the Grassland subarea subsurface drainage from the LSJR Watershed. We estimate that Grassland Subarea subsurface drainage comprises approximately 15 percent of the LSJR's annual salt load as measured at the Airport Way Bridge near Vernalis (Appendix 1). The San Luis Drainage Feature Re-evaluation Project, if implemented, is expected to have significant positive effect on water quality in the LSJR. Salts removed or isolated from the San Joaquin River by the San Luis Drainage Feature Re-evaluation Project would be applied as a credit toward meeting the USBR's CVP load allocation.

As the largest discharger of salt to the LSJR watershed, the USBR must play a commensurate role in the control of salt discharges. The Regional Board could formally engage the USBR in a salinity control program either through a cooperative mechanism such as a Management Agency Agreement (MAA) or through a regulatory mechanism such as WDRs. These options are discussed in more detail in Section 4.4.5.

Local Waters Districts

California Water Code Section 20200 defines a water district as any district or other political subdivision other than a city or county, a primary function of which is the irrigation, reclamation, or drainage of land or the diversion, storage, management, or distribution of water primarily for domestic, municipal, agricultural, industrial, recreation, fish and wildlife enhancement, flood control, or power production purposes. Water districts include, but are not limited to, irrigation districts, county water districts, water storage districts, reclamation districts, county waterworks districts, drainage districts, water replenishment districts, levee districts, municipal water districts, water conservation districts, community services districts, water management districts, flood control districts, flood control and floodwater conservation districts, flood control and water conservation districts, resource conservation districts, water management agencies, and water agencies.

There are approximately 30 public water agencies that have jurisdiction in the LSJR TMDL project area. The area contains approximately 9,000 individual farms (Table 4-3) that comprise over 1.4 million acres of agricultural land. This makes water quality control difficult at the individual farm scale. Public water agencies are generally better equipped to monitor and manage drainage than individual farmers. For these reasons, the Regional Board may seek compliance with TMDLs at the subarea level by using regulatory and non-regulatory mechanisms to engage public water agencies. We anticipate that most landowners will prefer to achieve TMDL compliance under the auspices of their respective local water agencies rather than work directly with the Regional Board. By working at the local district level, individual landowners can reduce TMDL compliance expenses through cost sharing of water quality planning and monitoring activities. Local water agencies will be encouraged to work together to implement regional salinity controls at the sub-basin scale, thus providing further increased economy of scale and more flexibility to both individual landowners and local water agencies in meeting TMDL load allocations. The Regional Board will need to work with individual landowners in areas that are not within the jurisdiction of a public water agency and in areas where public agencies decline to serve as representatives of their members on this issue.

Table 4-3. Estimated Number of Farms in LSJR TMDL Project Area

County	Ag Acres in County[1]	Ag Acres in Project Area[2]	Percent of Ag in Project Area[3]	Farms/county[4]	Farms in Project Area[5]
San Joaquin	578,310	14,486	2.5%	3,862	97
Stanislaus	404,250	380,666	94.2%	4,009	3,775
Madera	366,144	342,454	93.5%	1,673	1,565
Fresno	1,343,255	153,537	11.4%	6,592	753
Merced	541,741	541,741	100.0%	2,831	2,831
Estimated No. of Farms in Project Area					**9,021**

1 Source: Based on GIS analysis of DWR county level land use surveys (see Appendix B for information on DWR land use data)
2 Source: GIS analysis of the agriculture acreage within each county that is also within the TMDL project area
3 = [(Ag acres in project area/Ag acres in county) X 100]
4 Source: United States Department of Agriculture (USDA, 1999)
5 Farms per county is found by applying the ratio of agricultural land in the TMDL project area to the total for the county

The concept of managing agricultural drainage at the local water district and sub-basin level is evaluated and supported in a 1990 report entitled *Legal and Institutional Structures for Managing Agricultural Drainage in the San Joaquin Valley: Designing a Future* that was prepared by the Natural Heritage Institute (NHI) for the San Joaquin Valley Drainage Program. This report states that water supply districts have the ability to provide drainage service and seem to be best suited to take on drainage management responsibilities for a number of reasons including but not limited to:

- *The districts are in the best position to implement source control, given they are the dominant suppliers of irrigation water*

- *The districts can promote uniform improvements in irrigation practices on the farm*

- *The local districts are better able than the water development or regulatory agencies to tailor drainage solutions to the local variables*

- *The active cooperation of the districts and growers will be indispensable to a stable solution. That cooperation is most likely to occur if the districts, rather the federal or state agencies, are given control over drainage management (NHI, 1990, pp. I-3 to I-4.).*

Joint Powers Authority

Government entities in California can establish formal methods of cooperation through a mechanism called a Joint Exercise of Powers Authority (JPA). A JPA can be used by public agencies, including districts, to perform almost any function within the joint authorities of the agencies. Such agreements can be a contractual delegation of authority (empowering an agency to act on behalf of the other parties) or provide for the creation of a new entity to carry out the goals of the agencies party to the JPA. An advantage of JPAs is that they can provide a structure for conducting a range of activities through an independent entity, while leaving internal structure and procedural operations of participating districts intact, eliminating the need for reorganization of districts which might otherwise be needed to address specific functions or activities (NHI, 1990, Appendix C, p. 2.).

An example is the San Luis & Delta-Mendota Water Authority (SLDMWA), established in January of 1992. It consists of 32 water agencies representing approximately 2,100,000 acres of federal and exchange water service contractors within the western San Joaquin Valley, San Benito and Santa Clara counties. A primary purpose of establishing the SLDMWA was to assume the operation and maintenance responsibilities of certain USBR Central Valley Project facilities, with the goal of managing the facilities more efficiently and at a lower cost than the USBR. The SLDMWA also develops and disseminates information to legislative, administrative, and judicial bodies on a variety of issues such as: Sacramento and San Joaquin Delta water exports, water supply, water quality, water development, conservation, distribution, drainage, contractual rights, and surface and groundwater management. The SLDMWA also played an instrumental role in the December 15, 1995, Bay Delta Accord and developing legislation passed in 1996 by California voters as Proposition 204 - The Safe, Clean, Reliable Water Supply Act. (SLDMWA, 2002.)

The SLDMWA is a participant in the Grassland Bypass Project. This project involves the coordination and cooperation of multiple state and federal entities with overlapping authorities, interests or activities, including USBR, U.S. Fish and Wildlife Service (USFWS), U.S. Geological Survey (USGS), USEPA, the Regional Board, California Department of Fish and Game (CDFG), and the SLDMWA. The SLDMWA is responsible for controlling agricultural drainage water flows to and from the bypass. The Regional Board sets and enforces water quality regulations. The USBR, as owner of the bypass, is responsible for decisions regarding the use of the facility and compliance with Use Agreement No. 6-07-20-w1319, signed on November 3, 1995, between USBR and the SLDMWA. An oversight committee comprised of representatives from USBR,

USFWS, CDFG, The Regional Board, and the USEPA assists with decisions regarding the project and evaluates all operations of the project including monitoring and compliance with selenium load reduction goals. Sediment and water quality monitoring, biota sampling and toxicity testing are carried out or overseen by project participants. (SFEI, 1996 and Karkoski *et al*, 2002)

4.4.4 Criteria Used for Evaluating Implementation Options

There are a number of regulatory and non-regulatory implementation options that the Regional Board can use to achieve compliance with salt and boron water quality objectives. These options are presented in Section 4.4.5 below and range from conventional regulatory methods such as issuance of WDRs to non-regulatory approaches such as providing grant funding for implementation of nonpoint source controls. Each option has pros and cons that must be evaluated in order to identify the best available options. This section presents and explains the criteria that will be used to evaluate the implementation options. The six criteria are: 1) feasibility, 2) cost to dischargers, 3) state costs, 4) flexibility, 5) time needed to implement, and 6) likelihood of success.

Feasibility

Evaluation of feasibility is based on: 1) the feasibility of meeting water quality objectives and load allocations through implementation of an option; 2) the degree to which a given implementation option has a clearly defined process; and 3) the degree to which any constraints or requirements associated with the implementation option is likely to be met. Implementation options that have a proven track record of success and have worked well in a similar application (e.g., National Pollutant Discharge Elimination System (NPDES) permits to control wastewater treatment plant discharges, conditional prohibition of discharge to control rice pesticides, etc.) are also likely to be effective in controlling salt and boron discharges to the LSJR while allowing for continuation of the regulated activity. Alternatively, certain control options may not be feasible because the constraints of implementing the control option will preclude crop production or wetland operations.

Scoring

Scoring of this criterion ranges from zero to five, with a score of zero representing a low feasibility and score of five representing a high feasibility.

Costs to dischargers

This criterion evaluates the administrative cost of compliance (permit costs[2]) and relative implementation costs associated with each implementation option. The permitting costs used for the evaluation are taken directly from the State Water Board's fee schedule (Title 23. Division 3. Chapter 9 of the California Code of Regulation). Specific costs associated with implementation of each control option have not been determined because it unlikely that any one control option would be implemented in isolation. It's more likely that multiple implementation options would be implemented together as part of any proposed "alternative". Estimated monetary costs to discharges associated with

[2] On 30 September 2003 the State Water Board adopted a revised fee schedule for WDRs. This Draft does not reflect the revised fee, however, all reference to permit costs will be updated in the future.

implementation of each of the identified alternatives are given in Section 5 and supporting documentation is provided in Appendix 4.

Scoring
Scoring of this criterion ranges from zero to five, with a score of zero representing a high economic cost to dischargers and score of five representing a low economic cost to dischargers.

State Cost

This criterion evaluates the relative cost to state government for each implementation option. Cost considerations include: cost, if any, to develop new regulations or regulatory programs; cost associated with development, compliance and enforcement of permits or other regulatory controls. Regional Board staff resources comprise the majority of these costs.

Scoring
The administrative costs associated with each control option is estimated in Appendix 4 and scored in this staff report on a relative basis. Scoring of this criterion ranges from zero to five, with a score of zero representing a high economic cost to state government and score of five representing a low economic cost to state government.

Scoring for time needed to implement criterion

Personnel Year cost to state	Narrative score	Numeric score (range)
0-1	Low	5-4
2-5	Medium	2-3
5+	High	1-0

Flexibility

This criterion evaluates the degree to which a given control action can respond or adapt to new data and information. The criterion also evaluates the degree to which each implementation option provides flexibility to growers and wetland operators in meeting salt and boron limits.

Scoring
The flexibility of each control action is evaluated qualitatively and scored based on best professional judgment. Each of the control options will be evaluated relative to one another and scored on scale of zero to five, with zero being the least flexible and five being the most flexible.

Time Needed to Implement

Certain options will depend on additional regulatory actions by the Regional Board or other entities and will require time to develop the implementation program (for a program that is not currently in place). This evaluation criterion is not intended to analyze the time it will take to achieve water quality standards, but rather the time needed to develop and implement a given option. For example the time needed to develop and implement a

prohibition of discharge would include the time required to draft and adopt the necessary Basin Plan amendment language, however, it would not include the time needed to actually implement the prohibition (e.g., cessation of drainage discharge).

Scoring
An estimate of the time required to establish the implementation framework of a given alternative will be made. Scoring for this evaluation criterion will range from zero requiring the most time to implement and five requiring the least time to implement.

Scoring for time needed to implement criterion

Years needed to develop implementation program	Narrative score	Numeric score (range)
0-1	Low	5-4
2-3	Medium	3-2
4+	High	1-0

Likelihood of Success

The likelihood that a given control options will be successful as a stand alone measure or as part of an combination of measures will depend on its feasibility, cost to implement, flexibility, the time needed to implement the option, and its' consistency with existing laws and policies. Likelihood of success is a summary criterion that integrates the above-described criteria and provides a relative ranking of each available control option, with the goal of identifying the best options.

Scoring:
Scoring for this criterion is calculated by adding the scores from the above-listed criteria. Higher scores indicate a greater likelihood of success and lower scores indicate a lower likelihood of success.

Consistency with State and Federal Laws and Policies

Each implementation option is evaluated with respect to key state and federal laws and policies as described below. Each option will be identified as either being supportive, neutral, or inconsistent with policies evaluated below.

Porter-Cologne

Porter-Cologne requires the establishment of a program of implementation to meet water quality objectives. Porter-Cologne provides the Regional Boards with three general mechanisms for regulating the discharge of waste to waters of the State: WDRs; waivers of WDRs; and conditional prohibitions of discharge. The implementation options will be evaluated with respect to their consistency with the regulatory framework described in Porter-Cologne.

NPS Management Plan

The Nonpoint Source Management Plan includes a three-tier process for implementation of best management practices: Tier 1: Self-Determined Implementation of Management Practices [formerly referred to as "voluntary" implementation]; Tier 2: Regulatory Based

Encouragement of Management Practices; and Tier 3: Effluent Limitations and Enforcement Actions. The lowest "tier" that is likely to result in attainment of water quality standards is to be used. Higher "tiers" are to be used for persistent or more difficult water quality problems. "Tier 1" relies on voluntary efforts to adopt improved management practices; "tier 2" relies on incentives such as waivers of WDRs to encourage adoption of management practices and the use of Memorandums of Understanding (MOUs) and MAAs to facilitate coordination among agencies; and "tier 3" relies on adoption and enforcement of WDRs. The NPS management plan will be interpreted to give preference to options, which involve lower tier action, however, upper tier (i.e., tier 3) actions, such as issuance of NPDES permits will not be deemed inconsistent with the NPS with the policy.

Basin Plan Policies

Each of the control options will also be evaluated for consistency with the following relevant Regional Board and State Water Board policies:

Regional Board Policies

1) The Water Quality Limited Segment Policy
2) Watershed Policy
3) Policy for Obtaining Salt Balance in the San Joaquin Valley

State Water Board Policies

1) Nonpoint source Management Plan
2) Antidegradation Implementation Policy
3) The State Policy for Water Quality Control
4) Statement of Policy with Respect to Maintaining High Quality of Water in California

These policies are summarized in the Basin Plan and in Section 3.1.1 above.

Scoring

Each option will be determined to be supportive (+), neutral (0), or inconsistent (-) with the above-referenced policies. Any implementation option determined to be inconsistent with a relevant policy may be eliminated from consideration. The evaluation of policy consistency is contained in Appendix 3.

4.4.5 Evaluation of Salt and Boron Implementation Options

The objective of this section is to describe the range of regulatory and non-regulatory implementation options available to the Regional Board to control salt and boron discharges. The implementation options consist of administrative or institutional tools as opposed to actual on-the-ground implementation practices. This section includes discussion of the potential options that are available to the Regional Board to control salt and boron discharges. Each implementation option is evaluated using the criteria presented in Section 4.4.4. The implementation options are broken down into the following general categories

1) Regulatory implementation options, which use the Regional Board's regulatory authority to restrict or eliminate discharges

2) Non-regulatory implementation options, which rely on self-regulation or encouragement of discharge reduction through incentives such as grant funding, and formal cooperating agreements established through MOUs or MAAs

The section concludes with a relative ranking or scoring of all of the identified implementation options and identification of what are considered to be the best available options for controlling salt and boron discharges. The identified implementation options will be used to formulate a series of alternatives. Alternatives may consist of a no project alternative, a single implementation option, or a combination of implementation options. Each of the alternatives are described and evaluated in Sections 0 and 4.4.7.

Regulatory Implementation Options

This section describes regulatory mechanisms available to the Regional Board that could be used as part of a salt and boron control program. The following series of implementation options explain how each regulatory mechanism could be used.

Prohibition

When necessary, the Regional Board can prohibit certain waste discharges (Water Code § 13243). These prohibitions can apply to types of wastes and/or to specific areas.

Option 1: Prohibition of discharge from all agricultural and wetland return flows

The Regional Board would prohibit the discharge of salt and boron to the LSJR or its tributaries from all agricultural and wetland sources. Such a prohibition would fully implement the salt and boron base load allocations set forth in the TMDL.

Example Basin Plan Language:
The discharge of salt and boron in agricultural subsurface drainage, agricultural surface drainage, and drainage from managed wetlands to the San Joaquin River or its tributaries is prohibited.

Evaluation of Option 1: Prohibition of Discharge from all agricultural return flows and wetlands		
Factor	**Justification**	**Score**
Feasibility	Low-Prohibition of discharge has successfully been used to control selenium discharges in agricultural subsurface drainage in the Grassland Watershed. This option would rely on existing technology and therefore is technically feasible, however, widespread prohibition of discharge to control salt and boron would be overly restrictive and could result in a localized decrease in agricultural productivity from salt build up in soils and shallow groundwater. Full prohibition of discharge would minimize salt exports from the San Joaquin Basin and could result in a net salt build-up, therefore, this control option is not considered to be feasible.	0
Discharger Cost	High - No permitting or administrative fees would apply to a prohibition of discharge. Cost of implementation would be high, as all drainage would require treatment or retention.	0
State Cost	Medium - Compliance monitoring, regulatory oversight, and some enforcement would be required. Estimated 2-5 personnel years per year would be required for program development and oversight (Appendix 4).	3
Flexibility	Low-Option has little flexibility and does not allow for adaptive management or pollutant trading as discharges would be prohibited at all times and at all locations.	0
Time needed to implement	Prohibitions of discharge are already contained in the Basin Plan. A new prohibition of discharge for salt and boron could be developed in a relatively short amount of time (approximately 1 year). Regional Board oversight and follow-up needed to address dischargers not in compliance could require significant resources.	4
Likelihood of Success	Low-This option is considered to have a low likelihood of success because it is neither feasible nor flexible. This option does not facilitate a salt balance in the LSJR watershed and would likely have negative impact on both agricultural productivity and long-term water quality. The relatively high cost to dischargers also weighs against this option.	7
Consistent with Laws and Polices	See Appendix 3	No

Option 2: **Geographically focused prohibition of discharge from all agricultural and wetland return flows**

The Regional Board could prohibit the discharge of salt and boron to the LSJR or its tributaries from all agricultural and wetland NPS discharges from a specific geographic area.

Example Basin Plan Language:

> The discharge of salt and boron from agricultural subsurface drainage, agricultural surface drainage, and drainage from managed wetlands from the subarea to the San Joaquin River from any on-farm or wetland subsurface drain, surface drain, or other drainage conveyance system is prohibited.

Evaluation of Option 2: Geographically focused prohibition of discharge from all agricultural return flows and wetlands		
Factor	**Justification**	**Score**
Feasibility	Medium-Prohibition of discharge has successfully been used to control selenium discharges in subsurface agricultural drainage in the Grassland Watershed. This option would rely on existing technology and therefore is technically feasible. This option is considered to be more feasible than option 1 (Prohibition of Discharge from all agricultural return flows and wetlands) because the areas affected by the prohibition could be limited by targeting priority areas.	3
Discharger Cost	Medium to High - No permitting or administrative fees would apply to a prohibition of discharge. Cost of Compliance would be high in targeted areas because all discharges would need to be treated (retained) in those areas. The overall cost to implement, however, would be lower than for option 1.	2
State Cost	Medium - Compliance monitoring, regulatory oversight, and some enforcement would be required. Estimated 2 to 5 personnel years per year would be required for program development and oversight (Appendix 4).	3
Flexibility	Medium - This option provides substantial flexibility to areas that are deemed to be low priority and outside of the prohibition. Geographic areas within the prohibition area, however, would have little flexibility.	3
Time needed to implement	Prohibitions of discharge are already contained in the Basin Plan. A new prohibition of discharge for salt and boron could be developed in a relatively short amount of time (approximately 1 year). Regional Board oversight and follow-up needed to address dischargers not in compliance could require significant resources.	4
Likelihood of Success	Medium-This option does not facilitate a salt balance in the prohibition areas and could have negative impact on both agricultural productivity and long-term water quality in areas affected by the prohibition. Cost to dischargers is also relatively high.	15
Consistent with Laws and Polices	See Appendix 3	Yes

Option 3: Limited Prohibition of discharge from irrigation return flows and wetlands return flows

A prohibition of salt and boron discharges to the LSJR basin that are in excess of the load allocations or a concentration based threshold could be added to the Basin Plan. Such a prohibition would provide the regulatory mechanism needed to enforce the TMDL load allocations. A limited prohibition could either be applied to the entire LSJR watershed as in option 1 or to selected high priority areas as in option 2.

Example Basin Plan Language:

> The discharge of salt and boron in agricultural subsurface drainage, agricultural surface drainage, and drainage from managed wetlands, that are in excess of the load allocations contained in the control program for salt and boron discharges to the lower San Joaquin River, from any on-farm or wetland subsurface drain, surface drain, or other drainage conveyance system is prohibited.

Evaluation of Option 3: Limited Prohibition of discharge from irrigation return flows and wetlands return flows		
Factor	**Justification**	**Score**
Feasibility	High-Prohibition of discharge has successfully been used to control selenium discharges in subsurface agricultural drainage in the Grassland Watershed. Similar to options 1 and 2, this option would rely on existing technology and therefore is technically feasible. It would not be feasible for staff to determine if discharges were in compliance with load allocations because sufficient monitoring data is not available and dischargers under prohibition would not necessarily be required to characterize their discharges. Although a limited prohibition would allow for some salts to be discharged it would not be feasible from a Regional Board implementation perspective.	0
Discharger Cost	Low - No permitting or administrative fees would apply to a prohibition of discharge. Cost to implement would be relatively low compared to option 1 and 2 because only a portion of the salt and boron load generated would need to be treated-some loading would be allowed. Cost could be further reduced by implementing a limited prohibition to certain geographic areas (a hybrid of options 2 and 3)	4
State Cost	Medium - Compliance monitoring, regulatory oversight, and some enforcement would be required. Estimated 4 to 5 personnel years per year would be required for program development and oversight. The burden of determining compliance with load allocations would be placed entirely on the State.	3
Flexibility	Medium - This option provides some flexibility to all dischargers since drainage in compliance with load allocations would be allowed. The prohibition could be updated if new TMDLs were promulgated based on new information. It is anticipated that the areas that have historically discharged the largest salt and boron loads (Grassland and Northwest side subareas) would have the most difficulty in meeting the prohibition.	4
Time needed to implement	Prohibitions of discharge are already contained in the Basin Plan. A new prohibition of discharge for salt and boron could be developed in a relatively short amount of time (approximately 1 year). Regional Board oversight and follow-up needed to identify and address dischargers not in compliance would require a large amount of time and resources.	4
Likelihood of Success	Medium-This option has some likelihood of success since it provides limited opportunities for salt drainage and salt export from the San Joaquin River watershed and will result in a reasonable likelihood of meeting water quality objectives. This option scored high in the flexibility and time needed to implement criteria, however, the option is not considered to be feasible from a Regional Board implementation perspective since it would be difficult to determine if discharges were in compliance with the prohibition exception criteria (e.g. meeting load allocations).	15
Consistent with Laws and Polices	See Appendix 3	Yes

National Pollutant Discharge Elimination System (NPDES) Permits

The Federal Clean Water Act established the National Pollutant Discharge Elimination System (NPDES) to provide a mechanism to regulate point-source waste discharges into surface waters of the United States. In California, the nine Regional Boards administer the NPDES program. NPDES permits are typically issued to regulate point-source municipal and industrial discharges to surface waters, such as discharges from publicly

owned waste water treatment facilities or privately owned facilities that discharge at discrete locations.

Major point source discharges contributing salt and boron include municipal wastewater treatment facilities. Minor point source discharges of salt and boron to the LSJR include groundwater cleanup systems, fish hatcheries, and others. Most of the wastewater treatment facilities in the LSJR watershed discharge directly to land or the majority of their discharge is intercepted and used (for agricultural or wetland supply) prior to reaching the LSJR. The Cities of Modesto and Turlock are the two major municipalities that discharge directly to surface waters that actually reach the LSJR. Effluent flows and associated salt loading from these wastewater treatment plant discharges generally remain stable and are independent of hydrologic cycles, therefore, the relative contribution of salt loading from wastewater treatment facilities increases during drier year types when LSJR flows are low. On average, point source discharges from the Cities of Turlock and Modesto only account for approximately 2 percent of the total salt load of the San Joaquin River (Appendix 1). These loads, however, are expected to increase with population growth.

NPDES permits for municipal dischargers generally contain the following requirement "[t]he discharger shall use the best practicable treatment or control technique currently available to limit mineralization to no more than a reasonable increment." As NPDES permits are renewed, dischargers with elevated effluent salinity or who discharge to receiving waters with salinity problems (Table 4-4) are required to conduct studies of salt sources within their collection systems and develop salinity reduction plans that may contain one or more of the following elements:

1) Economic feasibility of potential salt and boron control options including source abatement, pretreatment processes and treatment options;
2) Proposed actions to control salt and boron discharges;
3) Proposed long term monitoring program;
4) Timeline of future work; and
5) Analyses of impact to ground and surface water quality.

Table 4-4. Wastewater Treatment Plants with Direct Discharges to the LSJR[1]

Facility	Effluent Flow Rate (mgd)	Salinity Control Plan Due by
City of Modesto	30.0[2]	May 2004
City of Turlock[3]	11.4	TBD-permit overturned
[1]Source data is in Appendix C: Estimates of Municipal and Industrial Salt Loads 2Approximatly 47 percent of the salt load from Modesto effluent is discharged to land [3]City of Turlock discharges to TID 5/Hrding Drain which flows to the LSJR		

Option 4: Continued NPDES regulation of point source discharges

The approach being taken to address point source dischargers is to initially focus on municipal and industrial (M&I) sources with discharges that reach the LSJR. M&I sources that discharge to land will be deferred to subsequent phases of the TMDL. The TMDL establishes waste load allocations for the Cities of Turlock and Modesto, the two wastewater treatment plants that discharge directly to surface water that reach the LSJR (other plants discharge to surface waters that are diverted prior to reaching the LSJR).

These initial waste load allocations may be reduced based on the results of the salinity control plans developed for each facility. NPDES permits for the Cities of Turlock and the Modesto will be revised to incorporate the TMDL salt load allocations (limits). Current NPDES permits for the cities of Turlock and Modesto have established interim performance goals that include load limits. The TMDL load allocations, if implemented, would constitute a significant reduction in allowable salt loading from these facilities compared to the existing interim limits.

Return flows from irrigated agriculture are not considered to be point sources under the CWA and the CWA specifically exempts irrigation return flows from the NPDES program. NPDES permits, therefore, cannot be used as a mechanism to regulate nonpoint source salt and boron loads, which account for the vast majority of the controllable salt and boron loading to the LSJR.

Example Basin Plan Language:

No new Basin Plan language is needed as this implementation option consists of continuation of an existing program already contained in the Basin Plan. The Basin Plan and most existing NPDES permits already contain provisions for regulating point source discharges in a manner consistent with TMDLs.

Evaluation of Option 4: NPDES regulation of point source discharges		
Factor	**Justification**	**Score**
Feasibility	High-Point source discharges to the San Joaquin River are currently being regulated under the NPDES. NPDES permits contain interim salt load limits that can be modified to implement TMDL waste load allocations.	5
Discharger Cost	Medium – Permitting costs are already incurred by the dischargers and changes to the permits would not require any significant increase in the administrative costs or fees associated with the existing permits. Costs to implement will depend the on discharger ability to use pollutant trading to meet waste load allocations. Upgrades to treatment works (e.g. reverse osmosis), however, would be costly. There is much uncertainty with regard to discharger cost because further restriction of salt discharges from wastewater treatment facilities would likely be required in the future even without the proposed control program.	3
State Cost	Low – Permit oversight is already conducted by the Regional Board and only marginal increases in oversight is expected as a result of implementing waste load allocations for salt	4
Flexibility	Medium – Changes in operations may be required to meet water quality objectives. This option is somewhat flexible since by design some waste load allocation is available throughout the year. Pollutant trading and real-time management could also be used to increase discharger flexibility in meeting waste load allocations.	4
Time needed to implement	Low - NPDES permits are already in place and are a required element of the Regional Board's water quality management program.	5
Likelihood of Success	High - Likelihood of success is high given the track record for controlling point source discharges through NPDES permits.	21
Consistent with Laws and Polices	See Appendix 3	Yes

Waste Discharge Requirements - Individual

Pursuant to the Porter-Cologne Water Quality Control Act (Water Code § 13260 et seq.) the Regional Board has the authority to issue individual or general WDRs, which govern the amount of pollution that can be discharged to a water body. Any person discharging waste or proposing to discharge waste is required to submit a report of waste discharge (ROWD) to the appropriate Regional Board. A Regional Board may also initiate the permit process by requesting a ROWD from an individual or entity. The Board also has the authority to require dischargers to prepare technical reports providing information related to a discharge and its impacts (Water Code § 13267).

Unlike NPDES permits, WDRs can be applied to waste discharges to land, groundwater, and from nonpoint source discharges to surface waters, including agricultural drainage. WDRs can be issued to parties discharging wastes, including individuals, agencies such as water districts, or companies. WDRs can specify the volume of discharge and set concentration and load limits on the constituents discharged. They can also set receiving water limits, the allowable concentration of a pollutant in the receiving water downstream of the discharge. The Regional Board can require ongoing discharger compliance monitoring as a permit requirement. Where discharge limits in WDRs cannot be met at the time of adoption, the Regional Board can establish a compliance time schedule or adopt a Cease and Desist Order that specifies steps that must be taken and a timeline that must be followed to bring the discharge into compliance.

WDRs could have an important role in the implementation of the salt and boron TMDL as they are the primary regulatory mechanism, available to the Regional Board that can be used to address nonpoint source discharges. Additionally WDRs would be effective because specific load limits or effluent limits could be incorporated into each permit.

Option 5: Adoption of WDRs for individual landowners

The Regional Board would issue WDRs to individual landowners discharging salt or boron to the LSJR or its tributaries.

Example Basin Plan Language:

> Salinity effluent limits equivalent to the base load allocations contained in the control program for salt and boron discharges to the lower San Joaquin River will be established in WDRs for all surface discharges to the San Joaquin River or its tributaries from agricultural lands and managed wetlands within the LSJR watershed. WDRs will be issued to the owner and/or operator of the land from which the discharge originates.

Evaluation of Option 5: Adoption waste discharge requirements for individual landowners		
Factor	**Justification**	**Score**
Feasibility	High - The Regional Board routinely issues WDRs to control discharges to groundwater and surface waters. WDRs can be used to regulate discharges from agriculture and other nonpoint sources. WDRs have successfully been used to control selenium discharges and implement a TMDL for selenium in the Grassland Subarea. WDRs contain effluent limits that can be set equal to load allocations contained in the salt and boron control program so there is a high degree of control over individual dischargers and certainty that water quality objectives will be met. Furthermore, WDRs can include monitoring and reporting requirements, which would readily allow staff to determine if waste load allocations were being met.	5
Discharger Cost	High – Administrative costs are high as there are an estimated 9,000 farms in the Lower San Joaquin River Watershed that would need to be regulated under individual WDRs. Administrative cost of compliance would be approximately $3.6 million based on an administrative cost (permit costs) of $400.00 to each farm. Additionally, cost of compliance would be high, as individual landowners would have to conduct compliance monitoring and reporting and incur the capital cost of implementation infrastructure at the field or parcel level.	0
State Cost	High – Extensive staff oversight would be needed to develop WDR's review self-monitoring data submitted from dischargers and conduct routine inspections. An estimated 200 personnel years (PYs) per year would be required over a ten-year period for program development and administration (Appendix 4). These staffing levels far exceed available resources; therefore this option is not feasible from state cost perspective unless it could be offset by fees.	0
Flexibility	Low- Flexibility is limited since load allocations are set at the farm or parcel scale. Provides limited incentive and opportunity for regional scale drainage management. Dischargers would be required to meet static load allocations pre-determined in WDRs and opportunities to manage export salts would be minimized. Areas that are not contributing to the problem are potentially responsible for complying with WDRs.	2
Time needed to implement	High – The time needed to develop individual WDRs at the farm or parcel level would be excessive given the staff resources available.	0
Likelihood of Success	Low- Although this option scored high in feasibility, it has a low likelihood of success because costs to the state and costs to dischargers are excessive. Additionally, regulatory effort and discharger expenditures would be diluted over a 2.9-million acre area, while rectification of the salt problem requires focused action. Discharger and state costs are excessive.	7
Consistent with Laws and Polices	See Appendix 3	No

Option 6: Adoption of waste discharge requirements for public water or agencies

Individual permits would be issued to public water agencies that have jurisdiction over irrigation and drainage operations for large areas in the watershed. Approximately 84% of the agricultural land in the LSJR watershed is located within the jurisdiction of these public water agencies. Agricultural lands not located within public water agency jurisdictions, however, would need to be addressed through individual permits issued directly at the farm or parcel level.

Example Basin Plan Language:

Salinity effluent limits equivalent to the TMDL load allocations will be established in WDRs for all discharges to the San Joaquin River or its tributaries from agricultural lands and wetlands within the LSJR watershed. WDRs will be issued to public water and resource agencies for discharges originating from within their geographic boundaries or by joint powers agreement between themselves and the public agency.

Evaluation of Option 6: Adoption of waste discharge requirements for public water agencies		
Factor	**Justification**	**Score**
Feasibility	High - The Regional Board routinely issues WDRs to control discharges to groundwater and surface waters. WDRs can be used to regulate discharges from agriculture and other nonpoint sources. WDRs have successfully been used to control selenium discharges and implement a TMDL for selenium in the Grassland Subarea. WDRs contain effluent limits that can be set equal to load allocations contained in the salt and boron control program so there is a high degree of control over dischargers and certainty that water quality objectives will be met. Furthermore, WDRs can include monitoring and reporting requirements, which would readily allow staff to determine if waste load allocations were being met.	5
Discharger Cost	Medium – Administrative costs associated with issuance of WDRs at the water district or local level are relatively low compared to issuance of WDRs to individual landowners (option 5). There are approximately 30 public water agencies with jurisdiction in the LSJR Watershed that would potentially be regulated with WDRs under this option. Administrative cost of compliance would be approximately $60,750 per year, applying an annual administrative cost (permit cost) of $2025.00 to each public water agency. Additionally, cost of compliance for applying WDRs at public water agency (water district) scale could be reduced through cost sharing of water quality planning, monitoring activities, construction of capital improvements, and operation and maintenance of implementation practices.	3
State Cost	Medium –Staff oversight would be needed to develop WDRs review self-monitoring data submitted from dischargers and conduct routine inspections. An estimated 6 PYs would initially be needed for program development and approximately 3 PYs per year would be needed for WDR oversight after initial start up (Appendix 4).	2
Flexibility	Medium- This option provides incentive and opportunity for regional scale drainage management. Dischargers would, however, be required to meet static load allocations pre-determined in WDRs thereby limiting opportunities to export salts. Areas that are not contributing to the problem are potentially responsible for complying with WDRs. Option 6 is considered to be more flexible than Option 5.	3
Time needed to implement	Medium - The time needed to develop and manage WDRs at the pubic water agency scale is estimated to be approximately 1 to 2 years.	3
Likelihood of Success	Medium - This option has a greater likelihood of success than issuance of WDRs to individual landowners (Option 5). Regulatory effort and discharger expenditures however would not necessarily be focused on the most important pollution sources.	16
Consistent with Laws and Polices	See Appendix 3	No

Option 7: Geographically focused waste discharge requirements

The Regional Board would issue WDRs to individual landowners and/or public water agencies located in specific geographic areas identified as posing a high threat to water quality. Focused WDRs would be designed to focus resources and regulatory actions on high priority areas or categories of discharges.

Example Basin Plan Language:

> Salinity effluent limits equal to the base load allocations contained in the control program for salt and boron discharges to the lower San Joaquin River will be established in WDRs for all discharges to the San Joaquin River or its tributaries from agricultural lands and managed wetlands within any subarea identified as high priority subarea.

Evaluation of Option 7: Geographically focused waste discharge requirements		
Factor	**Justification**	**Score**
Feasibility	High - The Regional Board routinely uses WDRs to control discharges to groundwater and surface waters. WDRs can be used to regulate discharges from agriculture and other nonpoint sources. WDRs have successfully been used to control selenium discharges and to implement a TMDL for selenium in the Grassland Subarea. WDRs contain effluent limits that can be set equal to load allocations contained in the salt and boron control program so there is a high degree of control over dischargers and certainty that water quality objectives will be met. Furthermore, WDRs can include monitoring and reporting requirements, which would readily allow staff to determine if waste load allocations were being met.	5
Discharger Cost	Low to Medium – Administrative costs associated with issuance of WDRs to individual landowners or public water agencies in focused high priority subareas are relatively low compared to widespread issuance of WDRs to individual landowners or public water agencies throughout the entire LSJR Basin (options 5 and 6). It is anticipated that the overall cost of compliance with this option would be relatively low since only high priority pollution sources would be targeted. Cost of compliance, however would be high for those targeted dischargers. Similar to option 6, cost of compliance for applying WDRs at public water agency (water district) scale could be reduced through cost sharing of water quality planning, monitoring, construction of capital improvements, and operation and maintenance of implementation practices.	4
State Cost	Medium –Staff oversight would be needed to develop WDRs, review self-monitoring data submitted from dischargers and conduct routine inspections. An estimated 2 PYs would initially be needed for program development and approximately 3 PYs per year would be needed for permit oversight after initial start up. Available resources could be focused on the most important pollution sources.	3
Flexibility	High- This option provides incentive and opportunity for regional scale drainage management in high priority areas and self directed compliance in low priority areas. Targeted dischargers would be required to meet static load allocations pre-determined in WDRs and opportunities to manage export salts would be minimized.	4

Evaluation of Option 7: Geographically focused waste discharge requirements (CONTINUED)		
Time needed to implement	Low –Development and management of WDRs in high priority areas could occur within 1-2 years after the adoption of the control program. Issuance of WDRs for individuals or public water agencies located in lower priority areas would occur later.	3
Likelihood of Success	Medium- This option has a relatively high likelihood of success because regulatory effort and discharger expenditures would be focused on the most important pollution sources. This is considered to be a highly feasible and flexible option with relatively low costs to dischargers.	19
Consistent with Laws and Polices	See Appendix 3	Yes

Option 8: Adoption of waste discharge requirements for the USBR/CVP

The Regional Board would adopt WDR's all imported water delivered by the USBR to the LSJR watershed through CVP or State Water Project facilities.

Example Basin Plan Language:

> Salinity effluent limits equal to the DMC load allocations contained in TMDL for salt and boron in the lower San Joaquin River will be established in WDRs issued to the U.S. Bureau of Reclamation (USBR) for water imported to the LSJR from the Delta via the Central Valley Project or State Water Project facilities. The USBR will be responsible to mitigate any salt discharges in excess of the limits specified in their WDRs. Mitigation for excess salts can include, but is not limited to, providing additional flows to increase assimilative capacity or by reducing saline discharges from other sources in the LSJR watershed.

Evaluation of Option 8: Adoption of waste discharge requirements for the USBR/CVP		
Factor	**Justification**	**Score**
Feasibility	High - The Regional Board routinely issues WDRs to control discharges to groundwater and surface waters. WDRs contain effluent limits that can be set equal to load allocations contained in the salt and boron control program so there is a high degree of control over dischargers and certainty that water quality objectives will be met. Additionally, WDRs have previously been used to regulated USBR discharges.	5
Discharger Cost	Medium - This option would consist of issuing a single WDR to a single discharger, therefore the administrative costs would be low relative to the magnitude of the discharge. Cost of compliance with DMC load allocations, however, could be high. The State Water Board's Water Rights Decision 1641 already places responsibility on the USBR to take action to meet the existing salinity water quality objectives at Vernalis. Meeting DMC salt load allocations could place increased responsibility on the USBR (beyond that required by D-1641). Additional dilution flows or mitigation could be needed.	3

Evaluation of Option 8: Adoption of waste discharge requirements for the USBR/CVP (CONTINUED)		
State Cost	Low - Staff oversight would be needed to develop a WDR and to review self-monitoring data submitted from the USBR. The staff resources needed to develop and administer WDRs for USBR salt loads in the DMC are estimated to be approximately 0.5 PYs per year. This represents a small investment in resources to gain control over one of the largest salt sources in the LSJR watershed.	5
Flexibility	Medium – This option would be as flexible as permit conditions allow. For example USBR could be met permit conditions by improving supply water quality, providing dilution flow, or through other mitigation such as implementation of drainage controls/reductions.	3
Time needed to implement	Medium - Development and management of a WDR for the DMC could occur within approximately 2-3 years of adoption of the control program.	2
Likelihood of Success	Medium - This option has a relatively high likelihood because regulatory effort and discharger expenditures would be focused on a single pollution source that has been identified as a high priority. Additionally, this option is considered to be feasible with a low cost to the State.	18
Consistent with Laws and Polices	See Appendix 3	Yes

Waste Discharge Requirements - General

In addition to individual WDRs, the Regional Board can issue general WDRs that are prepared to address a class of dischargers (i.e., the State and Regional Boards have general permits that apply to dairies, stormwater, application of bio-solids, and others).

Porter-Cologne specifies that the State Water Board or the RWQCBs can adopt general WDRs for a category of discharge when the following findings can be made.

1) *The discharges are produced by the same or similar operations*
2) *The discharges involve the same or similar types of waste*
3) *The discharges require the same or similar treatment standards*
4) *The discharges are more appropriately regulated under general discharge requirements than individual discharge requirements*

Option 9:Adoption of general waste discharge requirements for individual agricultural and wetland dischargers

The Regional Board would adopt a general WDR to regulate discharges from individual farms and wetland operations in the LSJR. Regulating multiple agricultural and wetland dischargers under one permit would significantly reduce the administrative workload associated with permitting individual dischargers. Applicants would be required to submit a Notice of Intent (NOI) to comply with the conditions specified in the general WDRs, including provisions for monitoring, drainage planning, and implementation of structural and operational management practices to control salt and boron. Salt and boron load allocations would be specified in general WDRs based on acreages of nonpoint source land use under the control of each applicant.

Example Basin Plan Language:

The General WDRs shall apply to all landowners discharging agricultural and/or wetland drainage to the LSJR and its tributaries. All agricultural and wetland dischargers shall file a NOI to comply with the general WDRs. Dischargers covered under the general WDRs shall comply with the permit conditions and the unit-area effluent limits specified in the TMDL for salt and boron dischargers in the LSJR.

Evaluation of Option 9:Adoption of general waste discharge requirements for individual agricultural and wetland dischargers		
Factor	**Justification**	**Score**
Feasibility	High - The State Water Board and the Regional Board routinely use general WDRs to regulate discharges to groundwater and surface waters for specific "classes" of discharge. Construction, industrial, and municipal storm water discharges, for example, are currently regulated under general WDRs. General WDRs could also be used to regulate discharges from agriculture and other nonpoint sources. General WDRs could contain effluent limits set equal to salt and boron TMDL load allocations. Additionally, general WDRs can be designed to include monitoring requirements and discharger self-certification of compliance with permit conditions. This provides a high degree of control over individual dischargers and certainty that effluent limits and water quality objectives would be met.	5
Discharger Cost	High – Administrative costs are high as there is an estimated 9,000 farms in the LSJR watershed that would need to be regulated. Annual administrative cost of compliance would be approximately $6.3 million dollars applying an administrative cost (permit costs) of $700 to each farm. Additionally, cost of compliance would be high, as individual landowners would have to conduct compliance monitoring and reporting and incur capital cost of implementation infrastructure at field or parcel level.	0
State Cost	High – A relatively small amount of staff time would be needed to develop general WDRs because many dischargers could be regulated under a single permit. Staff oversight would, however, be needed to review drainage management plans and self-monitoring data to determine permit compliance. Routine inspections and follow up would also be needed to address dischargers that are not in compliance. Initial program development is estimated to require approximately 1PYs; however, it is estimated that an additional 21 PYs per year would be required for program oversight and administration (Appendix 4). These staffing levels exceed available resources; therefore this option is not feasible from a state cost perspective.	0
Flexibility	Low- Similar to option 5, flexibility is limited since load allocations are set at the farm or parcel level. Provides limited incentive and opportunity for regional scale drainage management. Areas that are not contributing to the problem are potentially responsible for complying with general WDRs.	2
Time needed to implement	High – Implementation would require more resources than are available in the foreseeable future.	0
Likelihood of Success	Low-This option has relatively low likelihood of success because regulatory effort and discharger expenditures would be diluted over a 2.9-million acre area, while rectification of the salt problem requires focused action. Additionally, costs to the state and dischargers are relatively high and time to implement is long.	7
Consistent with Laws and Polices	See Appendix 3	No

Option 10: Adoption of general waste discharge requirements for public water agencies

The Regional Board would adopt general WDRs to regulate salt and boron discharges from public water agencies with jurisdiction in the LSJR. Individual farmers and wetland operators would be represented by their respective public water agency (local water/irrigation district). Public water agencies would be responsible for coordinating water quality management activities for their constituents and for ensuring that all of the conditions of the general WDRs are met.

Public water agencies that provide drainage service or own or operate drainage facilities may be legally responsible for drainage from those facilities. Other public water agencies may have no legal responsibility but may nevertheless choose to serve in a drainage management capacity to reduce individual costs to their members. In these cases it is the role of the individual discharger to request that their water agency volunteer to represent them, and in cases where this does not occur, regulation will occur on the farm level.

Example Basin Plan Language:

> General WDRs shall apply to all public water agencies discharging agricultural drainage or drainage from managed wetlands to the LSJR. Public water agencies include, but are not limited to, irrigation districts, county water districts, reclamation districts, drainage districts, and municipal water districts. Public water agencies shall file a NOI to comply with the conditions of the general WDRs and the unit-area effluent limits specified in the TMDL for salt and boron in the Lower San Joaquin River.

Evaluation of Option 10: Adoption of general waste discharge requirements for public water agencies		
Factor	**Justification**	**Score**
Feasibility	High - The State Water Board and the Regional Board routinely uses general WDRs to regulate discharges to groundwater and surface waters for specific "classes" of discharge. Construction, industrial, and municipal storm water discharges, for example, are currently regulated under general WDRs. General WDRs could also be used to regulate discharges from agriculture and other nonpoint sources. General WDRs could contain effluent limits set equal to the load allocations contained in the salt and boron control program. Additionally, general WDRs can be designed to include monitoring requirements and discharger self-certification of compliance with permit conditions. This provides a high degree of control over public water agencies and/or individual dischargers and certainty that effluent limits and water quality objectives would be met.	5

Evaluation of Option 10: Adoption of general waste discharge requirements for public water agencies (CONTINUED)		
Discharger Cost	Medium – Administrative costs are relatively low as there are approximately 30 public water agencies in the LSJR watershed that would need to be regulated. Annual administrative cost of compliance would be approximately $21,000 dollars applying an administrative cost (permit costs) of $700.00 to each public water agencies. Cost of compliance would be moderate. Individual landowners would benefit from economy of scale by working through their respective water districts. Additionally, water agencies could take advantage of public funding and financing available through various loan and grant programs. Water districts would be required to conduct compliance monitoring and reporting and incur capital cost of implementation infrastructure at a regional level.	3
State Cost	Medium – A relatively small amount of staff time would be needed to develop a general WDRs because many dischargers could be regulated under a single permit, however, staff oversight would be needed to review drainage management plans and self-monitoring data to determine permit compliance. Routine inspections and follow up would also be needed to address dischargers that are not incompliance. Initial program development is estimated to require approximately 1PY. Additionally, it is estimated that 4 PYs per year would be required for program oversight and administration (Appendix 4).	2
Flexibility	Medium- Similar to option 6, since load allocations are set at a regional scale there is opportunity for local control and flexibility in managing discharges, however, areas that are not contributing to the problem are potentially responsible for complying with general WDRs.	3
Time needed to implement	Low –Approximately one year would be needed to develop a general WDR applicable to public water agencies.	4
Likelihood of Success	Medium- This option has a relatively high likelihood of success because state costs and discharger costs are moderated by working at the regional level as opposed to regulation of individual dischargers. Additionally, this option provides proven mechanisms that will provide assurance that load allocations and/or permit conditions are met.	17
Consistent with Laws and Polices	See Appendix 3	No

Option 11: Adoption of geographically focused general waste discharge requirements

Separate general permits would be adopted for each of the seven geographic subareas delineated in the control program for salt and boron discharges to the LSJR. Each subarea permit would be tailored to the specific needs of the area being addressed. Adoption and implementation of each general WDR would be scheduled based on the unit-area loading from each subarea and the priority system specified in the control program for salt and boron discharges to the LSJR with the intention of addressing areas posing the greatest threat to water quality first. The general permits would be issued to either individual dischargers or to public water agencies with jurisdiction in each subarea.

Example Basin Plan Language:

General WDRs shall apply to all public water agencies discharging agricultural drainage or drainage from managed wetlands to the LSJR. Public water agencies include, but are not limited to, irrigation districts, county water districts, reclamation

districts, drainage districts, and municipal water districts. Public water agencies shall file a NOI to comply with the conditions of the general WDRs in accordance with dates contained in the schedule of compliance for meeting load allocations. Public water agencies shall be considered in compliance with the general WDRs when the unit-area effluent limits specified in the control program for salt and boron discharges into the Lower San Joaquin River are being met.

Evaluation of Option 11: Adoption of geographically focused general waste discharge requirements		
Factor	**Justification**	**Score**
Feasibility	High - The State Water Board and the Regional Board routinely use general WDRs to regulate discharges to groundwater and surface waters for specific "classes" of discharge. Construction, industrial, and municipal storm water discharges, for example, are currently regulated under general WDRs. General WDRs could also be used to regulate discharges from agriculture and other nonpoint sources. General WDRs could contain effluent limits set equal to the load allocations contained in the salt and boron control program. Additionally, general WDRs can be designed to include monitoring requirements and discharger self-certification of compliance with permit conditions. This provides a high degree of control over public water agencies and/or individual dischargers and certainty that effluent limits and water quality objectives would be met. This option also provides a clear mechanism for addressing the most important pollution sources first.	5
Discharger Cost	Low – Administrative costs are low as there are approximately 10 public water agencies in the LSJR Watershed that would need to be regulated. Annual administrative cost of compliance would be approximately $7,000 dollars, applying an administrative cost (permit costs) of $700.00 to each public water agency. Cost of compliance would be moderate. Individual landowners would benefit from economy of scale by working through their respective water districts. Additionally, water agencies could take advantage of public funding and financing available through various loan and grant programs. Water districts would be required to conduct compliance monitoring and reporting and incur capital cost of implementation infrastructure at regional level. Total cost of compliance would be lower than for Option 10 because low threat areas would potentially be "exempt" from compliance.	4
State Cost	Medium– A relatively small amount of staff time would be needed to develop General WDRs because many dischargers could be regulated under a single permit, however, staff oversight would be needed to review drainage management plans and self-monitoring data to determine permit compliance. Routine inspections and follow up would also be needed to address dischargers that are not incompliance. Initial program development is estimated to require approximately 3 PYs. Additionally, an estimated 2 PYs per year would be required for program oversight and administration (Appendix 1).	3
Flexibility	High- Similar to option 7, since load allocations are set at a regional scale, there is opportunity for local control and flexibility in managing discharges. Regulatory activity would be focused on the most important pollution sources.	4
Time needed to implement	Medium –Approximately 1-2 years would be needed to develop a general WDR applicable to public water agencies. Staff resource requirements for program administration are reasonable (though not currently available).	3

Evaluation of Option 11: Adoption of geographically focused general waste discharge requirements (CONTINUED)		
Likelihood of Success	Medium- This option has a high likelihood of success because regulatory effort and discharger expenditures would be focused on the most important pollution sources. State costs and discharger costs are relatively low. Similar to option 10, this option provides assurance that load allocation and/or permit conditions are met.	19
Consistent with Laws and Polices	See Appendix 3	yes

Waste Discharge Requirements – Waiver

Pursuant to Water Code section 13269 the Regional Board may waive WDRs for a specific discharge or a specific type of discharge if the waiver is not against the public interest. Waivers may not exceed five years in duration but may be renewed by the Regional Board. Waivers must be conditional and may be terminated by the Board at any time.

In July 2003 the Regional Board adopted a conditional waiver of WDRs program for discharges of wastes from irrigated lands to waters of the State. The irrigated lands waiver program is comprised of two conditional waivers of WDR's. "*One Conditional Waiver is for Coalition Groups or other entities, which form on behalf of individual discharges to comply with CWC and Regional Board Plans and Policies. The second Conditional Waiver is for individual Dischargers*" (CVRWQCB, 2003). Irrigated lands are defined in the waivers as "*lands where water is applied for producing crops and, for the purposes of these Waivers, includes, but is not limited to, land planted to row, field and tree crops as well as commercial nurseries, nursery stock production, managed wetlands and rice production"* (ibid). Coalition Groups and individual dischargers apply for coverage under the appropriate waiver by filing a Notice of Intent to comply with conditions set forth in the Waiver. Waiver conditions include provisions requiring Dischargers "*to prepare and implement technical reports to monitor surface water; evaluate, monitor, and implement management practices that result in attainment of receiving water limitations based on water quality objectives; and if directed by the Regional Board, implement additional measures to protect water quality*" (ibid.). The Regional Board is concurrently in the process of developing a 10-year implementation program to address discharges from irrigated lands. This implementation program includes preparation of an Environmental Impact Report.

Option 12: Implement the salt and boron TMDL through the existing waiver of waste discharge requirements for discharges from irrigated lands

Using this approach, the Regional Board would seek compliance with TMDLs at the subarea or regional level through the existing waiver of WDRs for discharges from irrigated lands. Dischargers would be required to meet load allocations to qualify for a waiver. Additional waiver conditions include requirements for monitoring to assess the sources and impacts of waste discharges, prioritization of pollutant sources, and implementation of management practices to prevent the release of wastes to surface

waters. The waiver program includes time schedules for completion of key milestones and submittal of deliverables. Failure of a discharger to meet the TMDL load allocations or other waiver conditions would result in the loss of the ability to operate under the waiver and would prompt regulation under a secondary mechanism such as WDRs (i.e., options 5,6,and/or 7) or prohibition of Discharge (i.e., options 1,2, and/or3).

Evaluation of Option 12: Implementation of the existing waiver of waste discharge requirements for discharges from irrigated lands		
Factor	**Justification**	**Score**
Feasibility	High - The State Water Board and the Regional Board has the authority to waive WDRs for specific discharges or types of discharges. Waivers of WDRs can contain conditions, which can provide some assurance that discharges will not impact water quality. The Regional Board can terminate waivers of WDRs at any time. In July of 2003 the Regional Board adopted a Waiver of WDRs for discharges from irrigated land. Low level of regulatory control over dischargers, however, may reduce incentive for compliance and delay attainment of meeting effluent limits and water quality objectives.	4
Discharger Cost	Low – Administrative costs are low as no permit fees apply to entities regulated under waivers of WDRs. Cost of compliance would presumably be lower than options that rely on WDRs or prohibitions of discharge.	5
State Cost	Low– A waiver program is already being developed for discharges from irrigated lands; therefore, only minor additional staff resources would be needed for program development. Additional resources would be needed to use the existing waiver program as an implementation mechanism for salt and boron control (integration of the existing waiver with the salinity control program). Approximately 1 new PY per year would be needed.	4
Flexibility	High- A waiver, by design, provides flexibility because monitoring data (required by waiver conditions) can be evaluated to guide the implementation actions required from dischargers.	4
Time needed to implement	Low –Approximately one year would be needed for waiver program development.	4
Likelihood of Success	High- This option has a relatively high likelihood of success, in part, because state costs and discharger costs are minimized. Certainty in meeting water quality objectives, however, is lower because less regulatory oversight would be used.	21
Consistent with Laws and Polices	See Appendix 3	yes

Option 13: Implementation of a waiver of waste requirements for dischargers participating in a Regional Board approved real-time management program.

The salt and boron TMDL includes opportunities for dischargers to use real-time TMDL allocations to facilitate more efficient salt management by reducing drainage and groundwater interactions and by allowing salts to be discharged during times when there is available loading capacity. Failure to allow salt exports from the basin will eventually result in long-term salt buildup in the basin and water quality degradation through uncontrolled groundwater discharges. The real-time load allocations contained in the TMDL are formulaic. Actual allocations would be based on real-time flow and water quality conditions and on a weekly or monthly forecast of assimilative capacity. Implementation of a successful real-time management program will require a formally coordinated effort among the dischargers in the LSJR watershed. Under real-time load

allocations, it will be the dischargers' responsibility to determine the available assimilative capacity of the LSJR and allocate that assimilative capacity among real-time program participants. Point and nonpoint source dischargers will need to develop and maintain the necessary facilities to store, release, and dispose of salts. Monitoring will be needed to meter discharges into the river in accordance with the real-time load allocations prescribed and to ensure that additional salt discharges do not result in water quality violations. Developing a coordinating entity and constructing the facilities needed to store, release, discharge, and dispose of salts will require significant investments from the real-time program participants.

Participation in a real-time water quality program will be entirely voluntary, however, entities choosing to participate in the real-time program will likely be regulated by the Board in some form (i.e., conditional waiver of WDRs). Participation in a real-time program would be offered to dischargers as an alternative to a more stringent regulatory approach such as prohibition of discharge or individual or general WDRs. Real-time load allocations will generally be greater (less restrictive) than the default TMDL base load allocations, providing participants with the opportunity to increase their discharges.

Example Basin Plan Language:

> A discharger will be considered to be in compliance with the control program for salt and boron discharges from irrigated lands in the lower San Joaquin River watershed if: 1) they are participating in a Regional Board approved real-time management program for the control of salt and boron in the lower San Joaquin River in accordance with Regional Board Resolution No. R5-2003-XXXX; and 2) real-time load allocations for salt and boron in the lower San Joaquin River are being met or discharges are occurring in accordance with site specific Regional Board-approved performance goals and milestones.

Evaluation of Option 13: Implementation of a new waiver of waste discharge requirements for participants of a Regional Board approved real-time management program		
Factor	**Justification**	**Score**
Feasibility	High - The State Water Board and the Regional Board have the authority to waive WDRs for specific discharges or types of discharges. The waiver would be designed to compliment the existing waiver of WDRs for discharges from irrigated lands and be conditioned upon dischargers complying with real-time load allocations. A real-time management demonstration program in the LSJR watershed was previously established through a multi-agency effort to demonstrate the utility of real-time management, however, physical implementation of real-time management has not been thoroughly tested. Salt exports are maximized to facilitate a watershed salt balance. Similar to option 12, however, the lower level of regulatory control over dischargers associated with waivers may reduce incentive for compliance and delay attainment of meeting effluent limits and water quality objectives.	4

Evaluation of Option 13: Implementation of a new waiver of waste discharge requirements for participants of a Regional Board approved real-time management program (CONTINUED)		
Discharger Cost	Low – Administrative costs are low as no permit fees apply to entities regulated under waivers of WDRs. Cost of compliance would also be relatively low for dischargers since real-time load allocations would generally be larger than base load allocations. This would reduce the volume of drainage water requiring treatment compared to all other implementation options evaluated	5
State Cost	Medium – A waiver program is already being developed for discharges from irrigated lands, however, additional staff resources would be needed to develop a companion waiver for real-time discharges that compliments the existing waiver. Additional resources would be needed for program oversight and administration. Approximately 1 to 2 PYs per year would be needed to implement a real-time based waiver program. These PYs would be needed in addition to the resources required to implement the existing ongoing waiver program for agricultural discharges.	3
Flexibility	High- A waiver, by design, provides flexibility because monitoring data (required by waiver conditions) can be evaluated to guide the implementation actions required from discharges. Real-time managements would provide the maximum flexibility to dischargers because allowable loading would be maximized.	5
Time needed to implement	Low –Approximately one year would be needed for waiver program development.	4
Likelihood of Success	High- This option has a relatively high likelihood of success, in part, because it is flexible and state costs and discharger costs are minimized. Large scale implementation of real-time management of drainage, however, is an untested and requires a high degree of discharger coordination and self-regulation.	21
Consistent with Laws and Polices	See Appendix 3	yes

Non Regulatory Control Options

Implementation of the salt and boron TMDL without regulatory control would rely exclusively on voluntary efforts from dischargers. Voluntary efforts to meet water quality objectives consist of those steps taken by dischargers or other entities without the presence of Regional Board regulatory efforts. The Board is often involved in these efforts by providing technical assistance and grant funding to help implement certain aspects of the projects or programs.

Identification of a serious water quality problem and the impending threat of regulatory or legal action is often a catalyst for effective voluntary actions. Relying on voluntary control actions alone, however, may put dischargers who voluntarily implement water quality controls at an economic disadvantage with those who do not. For example, if one farmer decides to implement tailwater capture and re-use systems to reduce discharges to the LSJR, that farmer incurs the cost of the pollution control while competing farmers may not incur such costs in the absence of regulatory control. Creating economic incentives to implement voluntary controls could remedy this problem but this is beyond the purview of the Regional Board. By strategically implementing regulatory controls, all dischargers that contribute salt and boron loads to the LSJR would be responsible for control or mitigation commensurate with the quantity and quality of their discharge.

Option 14: Promote voluntary efforts to comply with water quality objectives

The Board could make a more proactive effort to achieve compliance through voluntary steps by setting up a watershed-based effort to control salt and boron. The proactive effort could include promotion and participation in:

1) Efforts by water agencies to conduct analysis of salt/boron controls
2) Local efforts initiated by the Farm Bureau and non-governmental organizations or other stakeholder groups

Following the watershed approach, staff would primarily provide technical assistance, administer funding that may be available through the federal 319(h) program and other sources, and comment on proposed actions and timetables. The extent of progress made in reducing salt and boron levels in the river would be entirely dependent on the number and effectiveness of voluntary actions that can be initiated, and the conviction of the group to accomplish anything. While the Regional Board will continue to encourage and support voluntary efforts to improve water quality in the LSJR, voluntary efforts alone do not provide any assurance for long-term compliance with water quality objectives.

Evaluation of Option 14: Promote voluntary efforts to comply with water quality objectives		
Factor	**Justification**	**Score**
Feasibility	Low – Grant funds are available to promote voluntary implementation of management practices to control salt and boron discharges, however, staff time for project oversight is limited. Dischargers voluntarily implementing management practices at their own expense would be at competitive disadvantage with dischargers choosing not to implement management practices. There is no certainty that voluntary efforts will result attainment of water quality objectives.	1
Discharger Cost	Low – Administrative costs are low as no permit fees apply. Cost of compliance would also be low for dischargers as implementation of practices is voluntary and not required. Grant funds and low interest financing options are available to dischargers.	5
State Cost	Low– Grant funds for NPS implementation are already available. Additional resources may be needed for grant and project oversight. Voluntary implementation of management practices could occur with no state involvement.	5
Flexibility	High- Though this is the most flexible option for growers, there is no formal feedback mechanism incorporated to ensure that the voluntary actions being undertaken are effective and sufficient to bring LSJR into compliance with water quality objectives.	5
Time needed to implement	Low – Could occur immediately.	5
Likelihood of Success	High- Though this option has a relatively high likelihood of success because state costs and discharger costs are low, no assurances that water quality objectives will be met are provided.	21
Consistent with Laws and Polices	See Appendix 3	No

Option 15: Initiate a Management Agency Agreement (MAA) between the Regional Board, State Water Board, and the USBR.

The State Water Board, the Regional Board, and the USBR could enter into a Management Agency Agreement (MAA) whereby the USBR would be responsible for implementing management practices to control salt and boron discharges from the DMC or provide mitigation in the LSJR watershed. The USBR would, in effect, become the water quality management agency for USBR discharges from the DMC. The State Water Board and Regional Board could waive requirements for submittal of a report of waste discharge and issuance of WDRs provided that the conditions specified in the MAA were met. The prospect of using an MAA to control salt loading from the DMC would rely on the USBR's willingness to enter into such an agreement and conduct required mitigation.

Evaluation of Option 15: Initiate a Management Agency Agreement (MAA) between the Regional Board, State Water Board, and the USBR		
Factor	**Justification**	**Score**
Feasibility	Medium – The State Water Board has entered into Management Agency Agreements (MAAs) to facilitate cooperation and minimize duplicative efforts among agencies who actions have bearing on water quality in California. There are existing MAAs between the State Water Board and the Department of Forestry, Department of Pesticide Regulation, US Forest Service, and others. The State Water Board, the Regional Board, and the USBR could enter into an MAA that describes the steps that would be taken by each agency to address DMC salt imports to the LSJR; an MAA, however, is a cooperative agreement by nature and would provide little assurance that the USBR would meet load allocations since no regulatory requirements (e.g., WDRs) would be in place.	3
Discharger Cost	Low to Medium – Administrative costs are low as no permit fees apply. Cost of compliance with DMC load allocations, however, could be high. The State Water Board's Water Rights Decision 1641 already places responsibility on the USBR to take action to meet the existing salinity water quality objectives at Vernalis. Meeting DMC salt load allocations could place increased responsibility on the USBR (beyond that required by D-1641). Additional dilution flows or mitigation could be needed.	4
State Cost	Low– Staff resources would be needed to develop the MOU and for periodic oversight. Approximately, 0.5 PYs per year would be needed for development of the MAA and oversight of USBR mitigation.	5
Flexibility	High- Most flexible option for the USBR. MAA could be designed to incorporate adaptive management. Similar to option 8, the USBR could be met MAA conditions by improving supply water quality, providing dilution flow, or through other mitigation such as implementation of drainage controls/reductions. An MAA would, however, be inherently more flexible than a WDR.	4
Time needed to implement	Medium – Approximately Two years will be needed to develop the terms of the MAA and for the USBR to develop the for the infrastructure required to meet its load allocation.	3
Likelihood of Success	Medium- This option has a relatively high likelihood of success because state costs and discharger costs are low. It is anticipated that this option would be more favorable (than WDRs) to the USBR. No assurances that water quality objectives will be met are provided.	19
Consistent with Laws and Polices	See Appendix 3	No

Summary of Implementation Option Evaluation

Continued regulation of NPDES discharges (Option 4) is the only implementation option that was evaluated to address point source discharges. Although the NPDES program has been effective for regulating point sources, the CWA specifically disallows the use of NPDES permits to regulate irrigation return flows. Option 4 scored high in the evaluation process and was determined to be consistent with applicable laws and policies. Continued use of NPDES permits will therefore be used to control salt and boron loads from municipal and industrial discharges to the LSJR. Waste load allocations contained in the TMDL and the salt and boron control program will be incorporated into NPDES permits. This control option is already in place and by default will be incorporated into the preferred alternative identified in Section 3.4.9. No new program of implementation components or associated Basin Plan changes are therefore needed to implement waste load allocations for point sources.

The remainder of the implementation options address nonpoint source discharges from agriculture, managed wetlands, and the DMC. These implementation options fall under the following five categories of controls: 1) prohibition of discharge; 2) individual WDRs; 3) general WDRs; 4) waiver of WDRs; and 5) voluntary controls. The evaluation of the implementation options is a subjective analysis used as a screening tool to identify the types of options that will be most effective. Its purpose was not to definitively select the single best option or to rule an option out entirely. The evaluation suggests that implementation options which target groups of dischargers (public water agencies) are more likely to be effective than implementation options that seek to regulate individuals. The evaluation also indicates that geographically focused implementation options will be more likely to succeed than implementation options that would be applied uniformly throughout the entire LSJR watershed. The following control options scored high and were determined to be consistent with applicable laws and policies (Table 4-5):

Option 2 - Geographically focused prohibition of discharge from all agricultural return flows and wetlands

Option 7-Geographically focused waste discharge requirements

Option 8-Adoption of waste discharge requirements for the USBR/CVP

Option 11-Adoption of geographically focused general waste discharge requirements

Option 12-Implementation of the existing waiver of waste discharge requirements for discharges from irrigated lands

Option 13-Implementation of a new waiver of waste discharge requirements for participants of a Regional Board approved real-time management program

Additionally, the following control options scored high but were determined to be inconsistent with certain laws or policies:

Option 10-Adoption of general waste discharge requirements for public water agencies

Option14-Voluntary efforts to comply with water quality objectives

Option 15- Management Agency Agreement (MAA) between the Regional Board, State Water Board, and the USBR

These control options should not be ruled out since they could potentially be combined with other options to form an alternative that would be consistent with the applicable laws and policies. These options, however, should not be used as a stand-alone program of implementation.

Table 4-5. Scoring of Implementation Options

	Implementation Option														
Factor	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**
Feasibility	0	3	0	5	5	5	5	5	5	5	5	4	4	1	3
Discharger Cost	0	2	4	3	0	3	4	3	0	3	4	5	5	5	4
State Cost	3	3	3	4	0	2	3	5	0	2	3	4	3	5	5
Flexibility	0	3	4	4	2	3	4	3	2	3	4	4	5	5	4
Time Needed to Implement	4	4	4	5	0	3	3	2	0	4	3	4	4	5	3
Likelihood of Success	7	15	15	21	7	16	19	18	7	17	19	21	21	21	19
	L	M	M	H	L	M	M	M	L	M	M	H	H	H	M
Consistent with Laws and Policies	N	Y	Y	Y	N	N	Y	Y	N	N	Y	Y	Y	N	N

4.4.6 Alternatives Considered

The objective of this section is to develop a series of alternatives that incorporates a combination of the most feasible and cost effective control options for salt and boron discharges. Four alternatives were considered to guide the development of the Regional Board's program of implementation for achieving salt and boron water quality objectives. The alternatives described below consist of either implementing a single control option or implementing a combination of control options. These alternatives have varying levels of regulatory intervention ranging from no action to prohibition of discharge.

Alternative 1: No Project/No Action

The no project alternative is to continue to address salt and boron discharges to the LSJR through the existing State Water Board and Regional Board Basin Plan policies. No change from the current level of regulatory oversight would occur.

Alternative 2: Geographically focused Prohibition of Discharge

Alternative 2 consists of developing a prohibition of discharge that would apply to agricultural and wetland discharges throughout the LSJR watershed. The prohibition would be designed to focus regulatory efforts on high priority subareas (subareas with the highest salt yields) by phasing the prohibition in over time. Initially, the prohibition would only apply to high priority subareas. Staff would have to identify individuals and/or entities in violation of the prohibition and take appropriate regulatory action to resolve any problems identified. The prohibition would be phased into lower priority subareas after high priority areas are addressed and as resources become available. No action to address DMC discharges (salt imports) would be taken. The alternative is derived primarily from implementation option 2, which is geographically based prohibition of discharge.

Alternative 3: Focused General Waste Discharge Requirements for Public Water Agencies and Individual Waste Discharge Requirements for the DMC discharges (Implements TMDL Base Load Allocations)

This alternative would involve establishing a single general WDR or multiple subarea specific general WDRs to regulate public water agencies. Individual WDRs would be used to implement DMC load allocations. Dischargers would be required to file a notice of intent (NOI) to comply with conditions of the general waste discharge requirement(s). Compliance with TMDL base load allocations would be a condition of the general waste discharge requirement(s). Dischargers would also be required to: 1) prepare and submit drainage management plans; 2) identify the implementation practices to be used to meet base load allocations in accordance with time schedules specified in the general waste discharge requirement(s); and 3) conduct routine water quality monitoring to guide implementation efforts and demonstrate compliance with TMDL base load allocations. Staff would review discharger submittals, determine discharger compliance with general WDRs and take appropriate regulatory action when needed. General WDRs would be focused on areas that pose the greatest threat to water quality by targeting the subareas that generate the greatest salt loads per acre of nonpoint source land use. General WDRs would be developed for high priority areas first and eventually phased in for lower priority areas if additional controls are needed to meet water quality objectives.

An individual WDR would be developed for the USBR to address DMC discharges to the LSJR. The individual WDR would include effluent limits equal to TMDL base salt load allocations for the DMC.

This alternative is based on a combination of option 8 (adoption of waste discharge requirements for the USBR/CVP), option 10 (adoption of general waste discharge requirements for public water agencies), and option 11(adoption of geographically focused general waste discharge requirements).

Alternative 4a/4b: Combination Waiver of Waste Discharge Requirements, Focused General Waste Discharge Requirements, and Management Agency Agreement (MAA) to address DMC discharges (Implements TMDL Base Load Allocations or Real-time Load Allocations)

This alternative involves using a combination of the existing waiver of WDRs for discharges from irrigated lands and a new waiver of WDRs developed for dischargers participating in a Regional Board approved real-time management program. The existing waiver of WDRs must be implemented in the LSJR watershed regardless of which alternative is selected. This alternative builds on the existing waiver of WDRs by adding a companion waiver specifically designed to address salt and boron discharges to the LSJR and to facilitate the use of real-time management to control salt and boron discharges (as discussed in Section 4.4.1). Alternately, a salinity management program could be incorporated into the existing waiver of WDRs for discharges from irrigated lands.

This alternative would use a two-pronged approach whereby dischargers may participate in a real-time water quality management program and meet waiver conditions or alternatively dischargers may choose not to participate in a real-time management program and be regulated under a general waste discharge requirement. Compliance with real-time TMDL load allocations would be a condition of the waiver option. Compliance with the fixed TMDL base load allocations would be a condition of the general WDRs. Similar to Alternative 3, these general WDRs would be focused on high priority salt sources and phased in over time. Dischargers certifying that their discharges would remain below a trigger value of 315 µS/cm EC (see Appendix 1, Section 4.2 for the basis of the trigger value) would be unrestricted with regard to salt and boron and not subject to this control plan.

Dischargers choosing to participate in a real-time management program would be regulated by waiver of WDRs and benefit from increased load allocations (above base load allocations). Compliance with real-time load allocations would be a condition of the waiver program. For these reasons, it is expected that most dischargers would prefer regulation through waivers rather than regulation under a general permit.

Alternative 4 is comprised of two variants: alternative 4a) Real-time management without re-operation of drainage; and alternative 4b) Real-time management with re-operation of drainage. From a regulatory perspective both alternative 4a and alternative 4b would be implemented the same way using a combination of waivers of WDR's and WDR's as discussed above. From and implementation standpoint, however, there are major differences between the two variations of this alternative. Under alternative 4a, dischargers would essentially use real-time management as a way to increase short-term load allocations (monthly or weekly) by taking advantage of forecasted assimilative capacity. Dischargers would still be required to permanently manage or treat any drainage generated in excess of the available real-time load allocation. Using Alternative 4b, dischargers could re-operate discharges by temporarily storing saline drainage when real-time assimilative capacity is limited (typically during low flow periods) and then

releasing the stored drainage when assimilative capacity is available. This would significantly reduce the amount of drainage needing to be permanently managed or treated.

The Regional Board would attempt to establish an MAA with the State Water Board and the USBR to address salt imports from the DMC to the LSJR watershed. The MAA would include provisions requiring the USBR to comply with one or more of the following: 1) meet DMC load allocations; and/or 2) provide mitigation (e.g., drainage control and salt disposal, construction of an out of valley drain etc.); 3) provide dilution flows to create additional assimilative capacity for salt and boron in the LSJR. The MAA would also include a time schedule for implementation of these provisions. The net benefit of the USBR's corrective actions would need to be proportionate to their impacts. The MAA would allow for coordinated implementation of the State Water Board's Decision 1641 and the Regional Board's salt and boron control program. The Regional Board would pursue other avenues of from the USBR if they were not willing to enter into the MAA or provide an appropriate level of mitigation. Such action could include a request for report of waste discharge for DMC discharges.

This alternative is based on a combination of option 8 (adoption of waste discharge requirements for the USBR), option 10 (adoption of general waste discharge requirements for public water agencies), and option 11(adoption of geographically focused general waste discharge requirements), option 12 (use of existing AG waiver of waste discharge requirements, option 13 (new real-time management waiver of waste discharge requirements, option 15 (MAA to control USBR discharges).

4.4.7 Evaluation of Alternatives

The alternatives were evaluated using the following criteria:

1) Technical feasibility of implementation
2) Likelihood of meeting water quality objectives
3) Discharger cost to implement
4) Time needed to implement

A combination of existing flow models, water quality models, and spreadsheet modeling tools were used to help evaluate each implementation alternative with respect to the above-mentioned criteria. The two primary goals of this modeling were to determine the relative effect of implementing each alternative on long-term water quality compliance and to estimate the drainage volumes and associated salt loads that would need to be retained by dischargers under each implementation alternative. The volume of retained drainage is used to calculate the estimate of costs to implement each alternative (Appendix 4). The water quality-modeling component of this analysis provides an estimate of long-term water quality conditions, stated in terms of exceedances of the salinity water quality objective at Vernalis. Absolute prediction of water quality exceedance rates resulting from implementation of each alternative is not implied; rather, the model results are most appropriately used to compare the relative changes in long-term water quality exceedance rates resulting from implementing different drainage

control scenarios. A brief overview of the modeling approach is described below and a detailed discussion is provided in Appendix 5.

The California Department of Water Resource's (DWR) DWRSIM model is a planning and operations model that is used to assess water availability to the State Water Project under various scenarios (UCD, 1999). DWRSIM study 771 superimposes the current level of hydrologic development (e.g., existing dams, diversions, and operational rules etc.) on historical unimpaired flows. The model therefore calculates historic flows as if the system was historically operated the same way it is operated under current conditions and with the existing infrastructure in place. DWRSIM model output from DWR Study 771 was used to generate monthly time series discharge data (WYs 1922 though 1994) for four key river and tributary inputs to the San Joaquin River watershed. Discharge data was compiled for the LSJR Upstream of Salt Slough, the Merced River upstream of the LSJR confluence, the Tuolumne River upstream of the LSJR confluence, and the Stanislaus River upstream of the LSJR confluence.

The discharge data generated from DWRSIM was used as input to the San Joaquin River Input Output Model (SJRIO), which is a mass balance water quality model that calculates mean monthly discharges and salt concentrations for a sixty-mile reach of the LSJR from Lander Avenue to Vernalis (SWRCB, 1987). SJRIO was modified to run with historical data, stochastic data, or a combination of both (Grober and Kratzer 1989, Rashmawi et al. 1989). Further refinements added abilities to perform multivariate time series analyses of major model components and to generate stochastic data for Monte Carlo simulations (Grober et al. 1992). For this analysis, SJRIO was run in Monte Carlo simulation mode, using the discharge data generated from DWRSIM as inputs for San Joaquin River watershed boundary conditions. The SJRIO model run provided monthly discharge and TDS data output for the San Joaquin River at the Airport Way Bridge near Vernalis.

Vernalis flow and TDS data generated from SJRIO were imported into a post-processing spreadsheet model developed to ascertain the effect of imposing each implementation alternative on water quality in the LSJR near Vernalis. The spreadsheet model calculates changes in water quality exceedance rates resulting from changes in the amount of nonpoint source flows and loads generated from the following five source types:

1) Grassland Subarea subsurface drainage (tile drainage)
2) Grassland Subarea surface drainage (tailwater)
3) Wetland drainage
4) Non-grassland subsurface drainage
5) Non-grassland surface drainage

Total monthly flow and mean monthly TDS data generated from SJRIO were recalculated in the spreadsheet model by subtracting the drainage flows and loads "held back" (retained) to comply with a given implementation alternative. The volume of drainage and salt load associated with the five types of discharges listed above were estimated so that each alternative could be evaluated. For example, implementing a prohibition of discharge (Alternative 2) requires holding back all NPS drainage that is

generated (by the five source types listed above); while implementing the base load TMDL (Alternative 3) only requires holding back any drainage that is generated in excess of the TMDL base load allocations. The spreadsheet model also considers the constraint on discharge imposed by the SJR Selenium TMDL (McCarthy and Grober, 2001, CVRWQCB, 1996, CVRWQCB, 2001); all discharges of subsurface drainage from the Grassland bypass project were set at the 2010 (most stringent) load allocations specified in the Selenium TMDL. The annual drainage flows and loads that would need to be managed or treated to comply with each alternative were summarized. These included flows and loads that must be retained to comply with the selenium TMDL.

USBR releases from New Melones Reservoir to meet salinity water quality objectives have been included in the spreadsheet modeling analysis of all alternatives. The USBR's responsibility for salt in supply water exceeds the supply water credits provided to west side water users because the USBR is responsible for all salt in supply water that exceeds 52 mg/L while supply water credits are set at only 50 percent of the added salt in supply water (50 percent of the salt in supply water above 52 mg/L). The USBR's responsibility for salt in supply is partially achieved/mitigated through releases from New Melones, which are accounted for (included) in spreadsheet model calculations. Supply water credits and compensating supply water allocations, however, are not imposed in the spreadsheet model. The full effect of the USBR's prescribed responsibility to mitigate for salt imports is therefore not reflected in the spreadsheet model results for alternative 3 and 4. Imposition of the supply water credits and allocations would not affect the model output for Alternative 1 or 2 because supply water credits don't apply to these alternatives. Full imposition of the USBR's responsibility would result in model output that predicts a lower expected exceedance rate for Alternatives 3 and 4 than is predicted in this analysis. Reduced exceedances caused by imposition of the supply water credits and allocations would, however, be the same for alternatives 3 and 4. The relative difference in exceedance rates between alternative 3 and 4 would therefore also be the same.

Evaluation of Alternative 1: No Project. The no project alternative is technically feasible because no additional implementation practices would be required. Additionally, the no project alternative would be in effect immediately and require no additional discharger expenditure. Significant effects associated with ongoing agricultural and wetland operations would, however, continue to occur. The no project alternative assumes that the provisions of the State Water Board's Water Rights Decision 1641 will remain in effect. These provisions, in part, require that the USBR take action to meet the salinity water quality objectives at Vernalis. To date, this responsibility has been met through USBR water releases from New Melones Reservoir to dilute salt concentrations at Vernalis. Modeling results indicate that the Vernalis salinity water quality objectives will, however, continue to be exceeded even if these water quality releases are continued because during a series of dry years there is potentially insufficient water available for this purpose. DWRSIM study 771 imposes a 70-200 thousand acre-foot cap on the amount of water that the USBR will release to meet the Vernalis water quality objectives. This cap on water quality releases, however, is self imposed by the USBR's New Melones Interim Operation Agreement and does not relinquish the USBR from its

obligation to meet salinity objectives at Vernalis pursuant to the State Water Board's Decision 1641. Modeling studies conducted to support the State Water Board's 1995 Bay Delta Plan indicate that even if no cap were imposed on New Melones releases, water quality exceedances would still occur because New Melones Reservoir would drop below its invert elevation during drier periods and a sufficient quantity of dilution water would not be available to achieve the Vernalis WQO (Wilcox, pers. Com. 2003). This underscores the need to implement salinity controls (in addition to dilution) to meet the Vernalis objectives.

Salinity water quality exceedances under the no project alternative will be most pronounced during the irrigation season and during dry and critically dry year types. If the USBR were to stop providing dilution flows, the exceedance rate would increase. Comparison of the expected exceedance rates with and without the New Melones dilution flows provides an overall sense of the effect that the current USBR mitigation is already having on Vernalis water quality.

Expected salinity water quality exceedance rates under Alternative 1
(with D-1641 water quality releases)

Year Type	Irrigation season	Non- irrig. season
Critical	40%	34%
Dry	18%	14%
Below Normal	13%	15%
Above Normal	9%	7%
Wet	2%	1%

Expected salinity water quality exceedance rates under Alternative 1
(without D-1641 water quality releases)

Year Type	Irrigation season	Non- irrig. season
Critical	56%	41%
Dry	42%	24%
Below Normal	28%	21%
Above Normal	13%	9%
Wet	3%	1%

The no project alternative does not provide any assurances that water quality objectives will be met since historical water quality data indicates the LSJR frequently exceeds its water quality objectives during dry and critically dry year types. The no project alternative is, in effect, the status quo, which has not succeeded in meeting water quality objectives. Implementation of the current policies, at the current level of regulatory oversight is therefore unlikely to succeed in meeting water quality objectives in the future.

Evaluation of Alternative 2: Geographically Focused Prohibition of Discharge. The salt and boron technical TMDL report source analysis (Appendix 1) indicates that the Grassland and Northwest side subareas contribute the largest salt loads to the LSJR on both a total mass emissions and per unit area (of NPS land use area) basis. The Grassland and Northwest side subareas collectively contribute approximately 66 percent of the LSJR's total salt load. A focused prohibition of discharge would initially result in elimination of discharges from tile drains, surface drains, and wetlands from these high priority areas. If elimination of discharges from the Grassland and Northwest side subareas did not result in attainment of water quality objectives then the scope of the prohibition area would be expanded over time until salinity water quality objectives are met. Therefore, for long-term planning purposes, the evaluation of Alternative 2 is based

on the premise that a prohibition of discharge would eventually apply to the entire LSJR and that all NPS discharges (agricultural and wetland) to the LSJR would be eliminated.

Dischargers subject to the prohibition could comply using existing technology that ranges from plugging of surface and sub-surface drains to drainage water capture and re-use with ultimate disposal of saline drainage to evaporation ponds and/or landfills. These implementation practices are described in Appendix 2. While this implementation alternative is technically feasibility its effects on long-term agricultural and wetland viability have not been evaluated.

Alternative 2 provides a mechanism for making improvements in water quality objectives in the near term by eliminating the most significant saline discharges to the LSJR. Modeling results suggest that water quality exceedances would be significantly reduced compared to existing conditions (Alternative 1); however, a 19 percent exceedance rate is still anticipated during the irrigation season in critically dry years. Moreover, implementation of this alternative would likely result in a net build up of salts in the LSJR watershed since salts would continue to be imported in surface water supplies but no mechanism would be available to export salts out of the watershed. Increased soil and groundwater salinity would have a negative effect on both agricultural productivity and LSJR water quality since salt would eventually be discharged to the river through uncontrolled groundwater accretions.

Expected salinity water quality exceedance rates under Alternative 2 : Elimination of all drainage

Year Type	Irrigation season	Non- irrig. season
Critical	19%	10%
Dry	7%	3%
Below Normal	2%	1%
Above Normal	0%	0%
Wet	0%	0%

Alternative 2 has the highest cost to implement because it involves retention and management of all NPS drainage that is generated in the LSJR watershed (Appendix 4). Implementation of Alternative 2 would cost approximately 90 to 126 million dollars per year. Treatment of a large volume of drainage contributes to the relatively high cost.

Estimated volume of drainage needing treatment for implementation of Alternative 2.

Source Type	Volume (TAF)	TDS (mg/)
Grassland tile drainage	32-42	3,400
Grassland tail drainage	60	630
Wetland drainage	130	1,000
Non-Grassland tile drainage	10	1,700
Non-Grassland tail drainage	270	390

Alternative 2 could be implemented in a relatively short time because the prohibition areas would initially be focused on the high salt generating areas in the LSJR watershed. Prohibition of discharge is likely the fastest alternative to implement because it does not require development of new permits or waiver requirements, as would be the case for implementation of Alternatives 3 and 4.

Evaluation of Alternative 3: Focused General Waste Discharge Requirements for Public Water Agencies and Individual Waste Discharge Requirements for the DMC discharges. Similar to Alternative 2, initial regulatory efforts would focus on high priority subareas. General WDRs would however eventually need to be developed for lower priority subareas (East side subareas) because it is unlikely that salt and boron water quality objectives will be achieved entirely through controls on Westside discharges. Evaluation of Alternative 3 assumes a worst-case scenario whereby all discharges in the LSJR watershed would be regulated by seven subarea specific general WDRs. The general waste discharge requirement(s) would contain effluent limits set equal to the monthly TMDL base load allocations (Appendix 1). An individual WDR would be issued to the USBR to control discharges from the CVP by implementing monthly base load allocations for the DMC. This alternative constitutes full implementation of the TMDL base load allocations.

Implementation of Alternative 3 could be achieved using existing technology and is therefore technically feasible (Appendix 2). Alternative 3 would require construction of new facilities to convey, store, manage, and treat saline discharges. Expanded monitoring and drainage planning would also be needed.

Modeling results indicate that implementation of Alternative 3 would result in a marked improvement in water quality conditions at Vernalis. Similar to Alternative 2, significant water quality exceedances persist during the irrigation season in critically dry years (19%). These violations occur even though no load allocations are provided during times when no assimilative capacity is available. Implementation of Alternative 3 is expected to result in fewer exceedances of the water quality objectives during the non-irrigation season than Alternative 2 (prohibition). This is because Alternative 2 would require retention and treatment of all drainage, including some higher quality drainage that could be discharged to the river pursuant to Alternative3. These allowable discharges of higher quality drainage actually act to improve water quality at Vernalis.

Expected salinity water quality exceedance rates under Alternative 3 : TMDL Base Load Allocation

Year Type	Irrigation season	Non- irrig. season
Critical	19%	3%
Dry	7%	1%
Below Normal	2%	1%
Above Normal	0%	2%
Wet	0%	0%

The cost of implementing Alternative 3 is estimated to range from approximately 87 to 122 million dollars per year. These costs are slightly lower than costs for implementing Alternative 2, as the volume of drainage requiring treatment is reduced. The volumes of drainage needing treatment are shown as ranges because they vary depending on water year type. For example, the volume of Grassland subsurface drainage needing treatment ranges from approximately 13 thousand acre-feet during an above normal year type to

Estimated volume of drainage needing treatment for implementation of Alternative 3

Source Type	**Volume** (TAF)	**TDS** (mg/)
Grassland tile drainage	13-23	3400
Grassland tail drainage	60-114	450-650
Wetland drainage	9-76	1000
Non-Grassland tile drainage	4-9	1600-1700
Non-Grassland tail drainage	121-204	390

approximately 23 thousand acre-feet during a dry year type. The volume of drainage needing treatment depends on two factors: 1) The amount of drainage generated; and 2) The amount of load allocation allowed for a given water year type. The volume of drainage needing treatment is therefore not necessarily highest during critical years or lowest during wet years.

Alternative 3 would initially require more time to implement than Alternative 2 because the Regional Board would need to request reports of waste discharge and place dischargers in the appropriate general waste discharge requirement. Dischargers would need additional time to develop and initiate monitoring to demonstrate compliance with TMDL load allocations. In the long run, however, full implementation of Alternative 3 would be faster than Alternative 2 because less drainage would ultimately need to be managed.

Evaluation of Alternative 4a: Combination Waiver of Waste Discharge Requirements, Focused General Waste Discharge Requirements, and Management Agency Agreement (MAA) to Address DMC Discharges. Alternative 4 is perhaps the most feasible alternative because it allows the largest amount of salt load to be discharged to the LSJR and therefore requires the smallest amount of drainage treatment.

The expected salinity water quality exceedance rates at Vernalis for Alternative 4 would be the same as for Alternative 3. In critically dry years, a 19 percent exceedance rate (approximate) would still occur during the irrigation season unless more fresh water dilution flows were provided or groundwater accretions were reduced. This exceedance rate is anticipated despite the fact that no load allocations are given when salinity WQOs are being exceeded. Alternative 4 would likely result in better long-term water quality conditions than Alternative 3 because more salts could potentially be exported from the basin under a real-time water quality management program thus facilitating a salt balance opposed to a salt build up. Except for Alternative 1 (no project/no action), Alternative 4 would allow for the most direct discharge to the LSJR.

Estimated volume of drainage needing treatment for implementation of Alternative 4

Source Type	Volume (TAF)	TDS (mg/)
Grassland tile drainage	8-18	3400
Grassland tail drainage	0-30	430-670
Wetland drainage	0-32	1000
Non-Grassland tile drainage	0-5	1500-1700
Non-Grassland tail drainage	0-34	380

One of the primary advantages of Alternative 4 is the reduced cost to dischargers resulting from reduced treatment needs. Similar to Alternative 3, the volume of drainage needing treatment varies by year type depending on how much drainage is generated and how much drainage can be discharged to the LSJR. Table 4-6 shows the estimated quantity of drainage that would need to be retained and treated if LSJR discharges were to operate under real-time TMDL load allocations without any re-operation of drainage. Dischargers would be responsible for forecasting the assimilative capacity in the San Joaquin River at Vernalis and for coordinating discharges to the LSJR so that water quality objectives would be met while at the same time maximizing discharges to the river. The drainage volumes presented in Table 4-6 would be captured

and treated in a manner similar to Alternative 3. Based on these drainage volumes we estimate the cost to implement Alternative 4 to range from approximately 27 to 38 million dollars per year.

Table 4-6. Estimated Volume of Drainage Needing Treatment

	Critical		Dry		Below Normal		Above Normal		Wet	
Discharge Category	Volume TAF	TDS mg/L	Volume TAF	TDS mg/L	Volume TAF	TDS mg/L	Volume TAF	TDS mg/L	Volume TAF	TDS mg/L
Grassland Subarea tile drainage	18	3,400	17	3,500	18	3,500	8	3,400	9	3,400
Grassland Subarea tail drainage	30	570	13	670	10	640	2	430	0	n/a
Wetland drainage	32	1,000	17	1,000	9	1,000	14	1,000	0	n/a
Non-Grassland tile drainage	5	1,700	3	1,700	3	1,700	1	1,500	0	n/a
Non-Grassland tail drainage	34	380	2	400	6	370	0	n/a	0	n/a
Total Volume	**119**		**52**		**46**		**25**		**9**	

This table presents the estimated volume of drainage needing treatment using real-time TMDL load allocations with no drainage re-operation (Alternative 4a)

TAF = thousand acre-feet

Alternative 4b: Real-time management with drainage re-operation. The volume of drainage needing permanent treatment under Alternative 4 could be significantly reduced if drainage was re-operated. Drainage re-operation involves changing the timing of releases to the LSJR to coincide with periods of assimilative capacity by temporarily storing saline drainage when assimilative capacity is limited, then releasing stored drainage when assimilative capacity becomes available. Theoretically, salts would be temporarily retained when assimilative capacity is limited (low flow conditions). Retained salt would then be discharged back to the LSJR when additional assimilative capacity becomes available (higher flow conditions). It was assumed that any subsurface drainage captured from the Grassland subarea could not be discharged back to the LSJR because of elevated selenium concentrations. Eight to 18 thousand acre-feet of subsurface drainage would therefore always need to be retained and treated (Table 4-6), even with a comprehensive drainage re-operation system in place. All other drainage could eventually be discharged back to the LSJR (and not permanently treated). Additional conveyance and storage facilities would be needed to temporarily store and manage retained salts. The reduced cost associated with smaller volumes of drainage needing permanent treatment (capture, impoundment, treatment, and disposal to land) must be weighed against the opportunity cost of building re-operation infrastructure.

The biggest cost associated with re-operation of drainage would most likely be for the construction of ponds to temporarily store drainage during times of limited assimilative capacity. The maximum volume of drainage needing temporary storage is estimated to be approximately 50 thousand acre-feet. Approximately 12,500 acres of temporary storage

ponds would be required to impound this volume drainage, assuming an average pond depth of 4 feet. Conveyance systems would also be required to transfer stored drainage back to the river. The total cost for implementing real-time management with drainage re-operation is estimated to range from approximately 15 to 21 million dollars per year (Appendix 4).

Alternative 4 would require the most time to implement. Staff would need to develop a waiver of WDRs for dischargers participating in a Regional Board approved real-time management program. Guidelines would need to be developed that describes what an acceptable real-time management program must include. General WDRs would also need to be developed for each subarea for dischargers choosing not to participate in an approved real-time management program. SJR dischargers would need time to develop drainage management plans, prepare feasibility studies, and install real-time monitoring equipment and telemetry. Temporary retention ponds would also be needed if drainage were to be re-operated. The Regional Board and other authorities may need to issue permits to allow discharges from retention ponds.

4.4.8 Recommended Program of Implementation

Each of the four alternatives that were evaluated could be implemented using existing technology and are therefore potentially feasible. Alternative 1 (no project/no action) is obviously the least expensive and the easiest to implement. Staff does not recommend Alternative 1, however, because it would not result in any improvement in water quality and therefore would not sufficiently implement the existing salt and boron water quality objectives. Implementation of Alternative 2 is expected to result in significant improvements in water quality at Vernalis, but the greatest improvements in water quality are anticipated to result from implementation of Alternative 3 or Alternative 4. Alternative 3 and Alternative 4 are expected to result in the same amount of water quality improvement. Alternative 3 is generally more stringent than Alternative 4 since Alternative 4 allows for NPS discharges of salt equal to the real-time assimilative capacity of the LSJR, while Alternative 3 only allows for discharges equal to TMDL base load allocations (which are conservatively based on low flow conditions). Neither Alternative 3 nor Alternative 4, however, would allow for NPS discharges that contribute to increased water quality exceedences. A comparison of the expected salinity WQO exceedence rates associated with implementation of each alternative is shown in Figure 4-1.

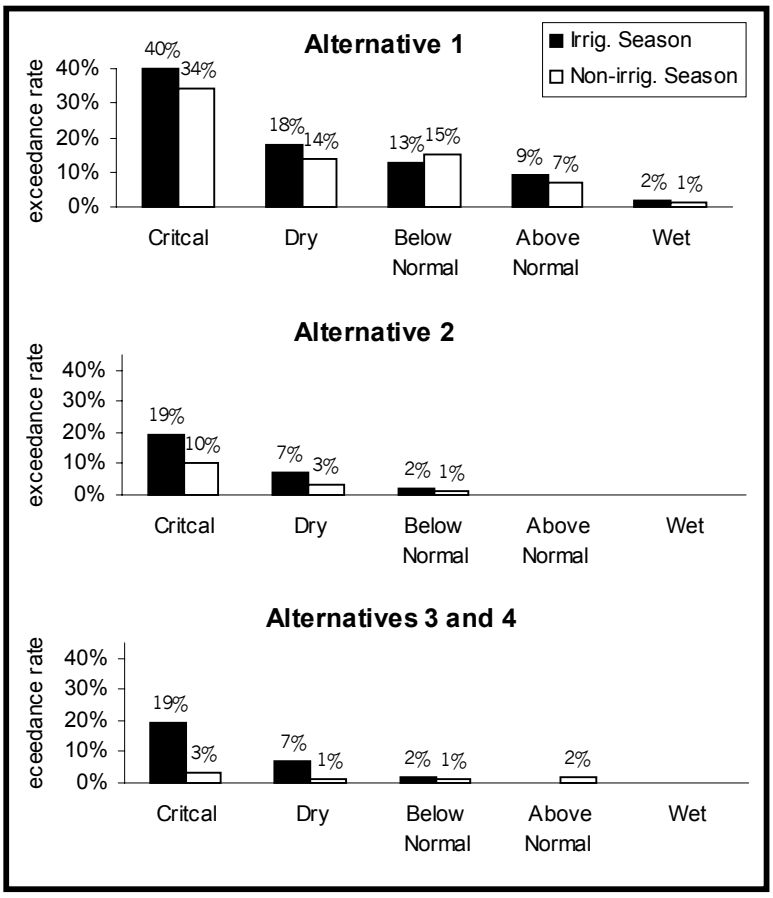
Based on the anticipated degree of water quality improvement, and in consideration of the cost of implementation (Table 4-7), the staff recommends Alternative 4.

Table 4-7. Estimated Annual Cost to Dischargers (Implementation Alternatives 1 to 4)

Alt. #	Description	Cost of Implementation ($ Million/Year)
1	No Action	0
2	Prohibition of Discharge	90-126
3	Base Load TMDL	87-122
4a	Real-time TMDL (no re-operation)	27-38
4b	Real-time TMDL with re-operation	15-21

Alternative 4 will achieve the same degree of water quality improvement as Alternative 3 at less than one third of the cost to dischargers. Alternative 4 is comprised of two variants: 4a) Real-time TMDL without re-operation; and 4b) Real-time TMDL with re-operation of drainage. Implementation of Alternative 4b will be less costly than implementation of Alternative 4a because less drainage water would need to be permanently stored and treated. Implementation of Alternatives 4a and 4b have some common institutional and infrastructure requirements. Both alternatives require increased monitoring, modeling, forecasting and coordination. Alternative 4b builds on Alternative 4a by adding a drainage re-operation component. Moving from Alternative 4a to Alternative 4b will require additional infrastructure (temporary retention ponds) and more sophisticated drainage management operations. Some dischargers may initially implement real-time water quality management without re-operation of drainage and then over time phase in drainage re-operation to save money in the long-term. The decision to implement drainage re-operation should be left up to the dischargers to provide maximum flexibility.

Figure 4-1. Expected Rate of Exceeding Vernalis Salinity Water Quality Objectives



4.5 Time Schedules

Porter-Cologne requires the Regional Board to include a time schedule for actions to be taken as part of the program of implementation. The recommended action to be taken by the Regional Board will be to adopt a control program for salt and boron discharges into the LSJR that is based on Alternative 4. Alternative 4 relies on a combination of mechanisms to control discharges, including the use of:

1) The existing waiver of WDRs for discharges from irrigated lands

2) A new waiver of WDRs for dischargers wishing to participate in a Regional Board approved real-time salinity management program

3) New subarea-specific general WDRs for dischargers choosing not to participate in a Regional Board approved real-time salinity management program

Adoption of new subarea-specific general WDRs will not require changes to the Basin Plan. Regional Board staff will recommend adoption of the new waiver of WDRs (real-time waiver) subsequent to the adoption of the proposed Basin Plan amendment. The subarea specific general WDRs and real-time waiver will include detailed time schedules for the actions to be taken. Therefore, the Basin Plan amendment does not need to include such a schedule.

4.5.1 Time Schedule for Compliance with Water Quality Objectives

Sufficient time will be needed to comply with the proposed allocations to allow for the planning, environmental review, design, and construction of facilities, and development of the needed organizational infrastructure to successfully implement the preferred alternative. Without the appropriate infrastructure in place, it will be difficult to achieve compliance with allocations and water quality objectives during low flow periods that may occur in all year types.

Salt and boron impairment in the LSJR has occurred over a long period of time and has resulted from complex land and water use patterns. The relationship between implementation of drainage management practices, surface and groundwater interactions, and long-term water quality conditions in the LSJR watershed is not well understood. Moreover, many of the variables that affect salt concentrations in the LSJR (e.g., flow, consumptive water use) are beyond the purview of the Regional Board. The salt and boron problem will therefore take a significant amount of time to resolve. The Regional Board can, however, establish a reasonable time frame for compliance with the proposed program of implementation (which entails compliance with real-time load allocations or fixed base load allocations).

Priority for the implementation of load allocations to control salt and boron discharges will be based on the unit area loading from each subarea. Unit area loading is equal to total load generated from each subarea divided by the acreage of nonpoint source land use in that subarea. The most significant sources of salt and boron are considered to be

the subareas with the greatest unit area loading to the San Joaquin River (Table 4-8). Subareas contributing smaller unit area salt loads are considered a lower priority and will be subject to more "distant" time schedules. This will allow the Regional Board to focus its efforts in the most important geographic areas and it will provide dischargers in lower priority subareas with additional time to resolve salt and boron problems without regulatory oversight. This approach is consistent with the Regional Board's Watershed Policy, which calls for "focusing efforts on the most important problems and those sources contributing most significantly to those problems."

Table 4-8. Priorities for Compliance with the Control Program

Subarea	Unit Area Load[1] (tons/acre/year)	Priority
San Joaquin River Upstream of Salt Slough	0.12	Low
Grassland	0.90	High
Northwest Side	2.61	High
East Valley Floor	0.24	Low
Merced River	0.14	Low
Tuolumne River	0.51	Medium
Stanislaus River	0.27	Low
[1] *Source: Appendix 1: Salt and boron technical TMDL staff report*		

Historical water quality data indicates that salt and boron water quality exceedences are most pronounced during drier year types. This is particularly evident during critically dry years. Salinity WQOs will be exceeded approximately 19 percent of the time in critical year types during the irrigation season even with the proposed control program in effect (Section 4.4.7). Furthermore, the estimated volume of drainage requiring treatment during a critically dry year is twice that of a dry year type (Table 4-6). This means that implementation costs will be at their peak during critically dry years. Accordingly, additional time has been provided to all subareas to comply with the load allocations that apply during critically dry years. The proposed schedule for compliance with load allocations or base load allocations is shown in Table 4-9.

Table 4-9. Schedule for Compliance with Salt and Boron Load Allocations

Subarea Priority	**Years to implement**[1]	
	Wet through Dry Year Types	**Critical Year**
High	8	12
Medium	12	16
Low	16	20
[1]number of years from the date of adoption of this control program		

4.5.2 Time Schedule for Establishing Upstream Water Quality Objectives

New water quality objectives for the SJR upstream of the Airport Way Bridge will be established in the second phase of this TMDL. Establishment of objectives will be based on:

- criteria to protect the beneficial uses
- assessment of what water quality objectives can be achieved through load reductions

The need for flow augmentation will be evaluated for reaches of the San Joaquin River that currently have little or no flow, except for groundwater accretions and agricultural return flow. In such areas, control of surface discharges will not necessarily result in attainment of salinity concentrations that protect the beneficial uses. The LSJR, from Sack Dam to the confluence with the Merced River in particular, may require controls beyond the regulation of surface water discharges. At current levels of funding and staffing, it is anticipated that a Basin Plan Amendment to adopt new water quality objectives, a revised TMDL, and program of implementation will be ready for consideration of adoption by the Regional Board by March 2006. Criteria to protect the beneficial uses will be proposed in October 2004. An assessment of the water quality objectives that can reasonably be achieved through load reductions will be completed by June 2005. A draft phase II TMDL with water quality objectives and program of implementation for LSJR from Mendota Dam to Airport Way Bridge near Vernalis will be completed by September 2005. A Basin Plan Amendment to adopt this TMDL will be completed for Regional Board consideration by June 2006.

4.5.3 Time Schedule for Establishing Groundwater Control Program

A groundwater control program will be developed in a subsequent phase of this TMDL if water quality objectives in the SJR near Vernalis cannot be attained through salt load reductions (in surface discharges) and other measures. Such a groundwater control program will require extensive data collection and modeling of surface/groundwater interactions. This assessment will commence pending the success of salt and boron surface discharge control program in the LSJR, and flow augmentation, as appropriate, to resolve salinity impairments in the LSJR. Success of the salt and boron control program will be assessed after medium priority subareas have implemented controls for wet through dry water years types, twelve years from the effective date of this surface water control program. If, after twelve years from the effective date of this control program, it is determined that a groundwater control program is needed to meet water quality objectives, such a program will be developed in the three years following that determination. A groundwater control program, if needed, will therefore be completed by approximately June 2020.

4.6 Surveillance and Monitoring

California Water Code Section 13242 requires that a program of implementation for achieving water quality objectives include a description of the surveillance to be undertaken to determine compliance with objectives. This information is contained in Chapter V of the Regional Board's Basin Plan (Surveillance and Monitoring). The Regional Board's existing Surveillance and Monitoring program for the Sacramento and San Joaquin River Basins is comprised of the following seven general elements.

1) ***Data Collected by Other Agencies***
The Regional Water Board relies on data collected by a variety of other agencies. For example, the DWR has an ongoing monitoring program in the Delta and the USGS and DWR conduct monitoring in some upstream rivers. The USBR collects extensive flow and water quality data associated with CVP operations. The California Department of Fish and Game, US Fish and Wildlife Service, USGS, and California Department of Health Services also conduct special studies and collect data.

2) ***Regional Water Board and State Water Board Monitoring Programs***
The State Water Board manages its own Toxic Substances Monitoring (TSM) program to collect and analyze fish tissue for the presence of bioaccumulative chemicals. The Regional Water Board participates in the selection of sampling sites for its basins and annually is provided with a report of the testing results. The Regional Board collects extensive water quality data under the Surface Water Ambient Monitoring Program and special studies.

3) ***Special Studies***
Intensive water quality studies provide detailed data to locate and evaluate violations of receiving water standards and to make waste load allocations. They usually involve localized, frequent and/or continuous sampling. These studies are specially designed to evaluate problems in potential water quality limited segments, areas of special biological significance or hydrologic units requiring sampling in addition to the routine collection efforts.

4) ***Aerial Surveillance***
Low-altitude flights are conducted primarily to observe variations in field conditions, gather photographic records of discharges, and document variations in water quality.

5) ***Self-Monitoring***
Self-monitoring reports are normally submitted by the discharger on a monthly or quarterly basis as required by the permit conditions. They are routinely reviewed by Regional Water Board staff.

6) ***Compliance Monitoring***
Compliance monitoring determines permit compliance, validates self-monitoring reports, and provides support for enforcement actions. Discharger compliance monitoring and enforcement actions are the responsibility of the Regional Water Board staff.

7) ***Complaint Investigation***
Complaints from the public or governmental agencies regarding the discharge of pollutants or creation of nuisance conditions are investigated and pertinent information collected.

No changes to the surveillance and monitoring chapter of the Basin Plan (Chapter V) are needed for the proposed amendment. Instead, self-monitoring requirements will be specified in waiver conditions or WDRs (for dischargers not participating in a waiver based program), and NPDES permits for point source discharges.

4.6.1 Proposed Surveillance and Monitoring Activities

Monitoring will be needed to determine if the proposed Basin Plan amendment, once adopted, is successful in implementing the existing salt and boron water quality objectives in the San Joaquin River at the Airport Way Bridge near Vernalis. The responsibility for conducting self-monitoring ultimately rests with the dischargers who are regulated under the control program. It is the Regional Board's responsibility to conduct compliance monitoring and monitoring for special studies. The Regional Board and other agencies (e.g., USGS, DWR) conduct routine flow and EC monitoring that can be used to augment discharger-monitoring efforts. If ongoing agency-led monitoring programs are discontinued it will be the discharger's responsibility to continue any necessary monitoring. The goals of the monitoring program will include:

Goal 1: Determining compliance with established water quality objectives for salt and boron

Goal 2: Determining compliance with established waste load allocations and load allocations for salt and boron

Goal 3: Determining the effectiveness of management practices in controlling salt and boron discharges to the LSJR

Goal 4: Facilitating real-time water quality management

Of the four goals, the highest priority is to determine compliance with water quality objectives (Goal 1). Monitoring will be needed to determine if water quality objectives are being met. This Monitoring will be conducted by outside agencies and compiled and analyzed by the Regional Board. Since this control program is designed to meet the salinity and boron water quality objectives in the San Joaquin River at the Airport Way Bridge near Vernalis, at least one sampling site is needed at this location. The USGS collects continuous flow and EC data at the San Joaquin River at the Airport Way Bridge near Vernalis and the Regional Board collects TDS and boron grab samples on a monthly basis. These combined monitoring programs will achieve Goal 1.

If water quality objectives are not being met, then it is important to determine which areas are not meeting their allocations (Goal 2). Flow, EC, TDS, and boron monitoring will be needed to characterize salt and boron loads generated from each subarea because load allocations have been set at the subarea level. In most cases, subarea loads can be determined by establishing one or two key monitoring stations located upstream of the subarea confluence(s) with the main stem of the LSJR. Flow monitoring stations should paired with water quality monitoring whenever practical. Flow and EC monitoring should be conducted on a continuous basis. Sampling for boron and TDS should be conducted at a weekly or monthly frequency depending on site-specific variability. The suggested sites to accomplish Goal #2 are listed in Table 4-10. More sites may be necessary to

characterize the East Valley Floor and Northwest side subareas because these areas are adjacent to the LSJR and drain diffusely to the river from many locations.

Table 4-10. Suggested Monitoring Sites

Suggested Monitoring Sites for Determining Compliance with Subarea Load Allocations				
Subarea	**Monitoring Sites**	**Status/Agency**		
		Flow	EC	TDS/Boron
Stanislaus River	Stanislaus River near Ripon	C/USGS	C/USGS	
Tuolumne River	Tuolumne River at Modesto	C/USGS	C/USGS	
Merced River	Merced River near Stevinson	C/DWR	C/DWR	
Northwest	Ingram Creek	N	N	
	Hospital Creek	N	N	
	Del Puerto Creek	N	N	
	Orestimba Creek	C/USGS	C/USGS	
	Spanish Creek	N	N	
	SJR at Crows Landing	C/USGS	C/USGS	
East Valley Floor	Harding Drain/TID Later #5	N	N	
	TID Laterals #2,#3,&#6	N	N	
	MID Lateral #4	N	N	
Grassland	Salt Slough at Hwy 165 near Stevinson	C/USGS	C/USGS	
	Mud Slough (north) near Gustine	C/USGS	C/USGS	
	Los Banos Creek	N	N	
Upstream of Salt Slough	San Joaquin at Lander Ave	C/DWR	C/DWR	
C = continuous, M = monthly, W = weekly, P =periodic/unspecified, N = no monitoring or unknown status				

If allocations are not being met, it is important to know whether the necessary management practices are being implemented to control salt and boron discharges and if those practices are effective (Goal 3). To meet Goal #3 (determine degree of implementation of management practices), information must be collected from growers on the types of practices being used and how those practices are being applied. The following factors should be considered in collecting this information: 1) minimize the paperwork burden on growers; 2) use existing reporting systems; and 3) create a repository for the data that will allow for ease of data entry and analysis.

To assess the effectiveness of specific management practices or strategies, field level evaluations will need to be conducted. In most cases, salt and boron management practices simply involve preventing drainage from entering the LSJR, so verification that these practices are actually being implemented is generally more important than assessing their effectiveness. Field evaluations should be conducted to quantify the amount of load reduction or reduction in off-site migration of salt and boron that could be expected with implementation of a new management practice or strategy. Field evaluations will also be necessary to demonstrate that a discharger or group of dischargers are meeting the conditions specified in applicable waivers or general permits.

4.6.2 Future studies

In 1997 the Basin Plan was amended to include a prohibition of agricultural subsurface drainage from the Grassland Watershed. The supporting staff report for that amendment recommended a number future studies to facilitate refinement of water quality objectives and implementation of effective drainage controls (CVRWQCB, 1996). Most of the recommend studies have not yet been carried out, but there is still a need for this information. The recommended studies and ongoing data needs that are relevant to the control of salt and boron are summarized below.

1) Development of a regional groundwater model. The TMDL source analysis estimates that salt loading to the LSJR from groundwater accretions account for approximately 30 percent of the LSJR's total salt load (as measured at the Airport Way bridge near Vernalis). This is a coarse estimate, however, and available loading capacity and load allocations are dependent on groundwater loading. It is therefore important to refine groundwater-loading estimates to ensure that load allocations are appropriate. Moreover, ground and surface water interactions as well as the impacts of certain management practices are not well understood. Funding for a watershed groundwater model should be a high priority.

2) An assessment of the efficacy and the cost and benefits of actions taken by dischargers to meet water quality objectives.

3) Development of drainage reduction technology and transfer to the farm level. The biggest unknown in utilizing water management to implement load reductions is the effectiveness of the available technology. Efforts should be focused on determining which technologies (or parts of technologies) have the greatest potential for successful implementation within the drainage problem area. These are most effectively answered using a multi-disciplined effort to develop information about drainage reduction technology and transfer this to the farm level. Several existing mechanisms are available for development of the technology (United States Department of Agriculture (USDA), Agricultural Research Service (ARS), University of California (UC) Cooperative Extension, and private efforts) and its transfer (UC Cooperative Extension, USDA, NRCS, local water agencies, and private efforts). The role of the Regional Board should be to encourage and support these efforts.

4) Regional watershed storage of salt and other watershed drainage solutions needs to be studied to determine their risk as compared with the risk or cost associated with continued use of the San Joaquin River as an outlet. The Regional Board should provide support to agencies attempting to find grant funds for these studies and, as available, allocate resources to determine whether these solutions are applicable in the watershed and whether interim sites should be tested.

5) Studies on the use of a valley wide drain to carry salts generated by agricultural irrigation out of the valley should be continued as the only feasible, long-range

solution for achieving a salt balance in the Grassland watershed and in the Central Valley.

6) Study the effect that well water and the reuse of subsurface drain water have on decreased soil quality, i.e., increased salt and boron concentration, reduced yield, and increased use of Delta water for leaching and subsequent increased drain water volume and loads.

7) Load monitoring studies to establish effectiveness of control measures for toxic trace elements, salinity and boron. These studies should focus on establishing cause-and-effect relationships.

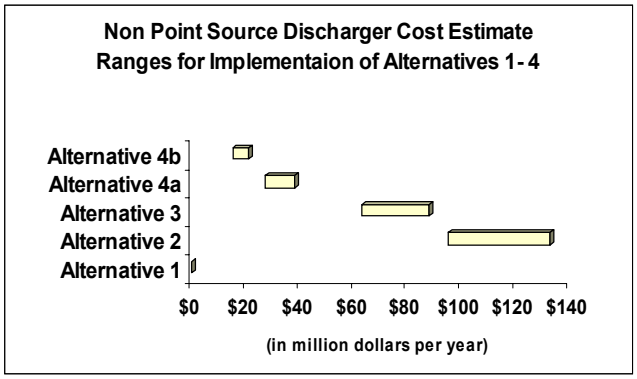
These studies have been presented here to recognize limitations in the current database. The studies are not proposed for incorporation into the Basin Plan.

5 Economic Analysis

Following is a summary of the economic analysis provided in Appendix 4. This economic analysis is intended to provide estimates of the major direct costs associated with a limited number of salt and boron control strategies. It is not intended to provide definitive cost estimates for compliance with the proposed control program. The analysis rather provides relative cost estimates associated with a limited number of alternatives for the control of salt and boron in the LSJR.

Cost estimates for both point and nonpoint source discharge controls typically include large one-time capital outlay costs and recurring annual operation and maintenance costs. Capital outlay for nonpoint source controls are amortized over 20 years at 6 percent interest. Capital outlay for point source dischargers are amortized over 20 years at 3 percent interest. The 3 percent interest rate for point source dischargers is reflective of low interest loans available to Publicly Owned Treatment Facilities through the State's Revolving Fund Loan Program. Amortized capital outlay is added to annual operation and maintenance cost so an estimate of total annual costs can be provided. Total annual costs presented in this report are therefore representative of amortized capital outlay plus annual operation and maintenance cost over a 20-year period.

Implementation of a control program for salt and boron discharges to the LSJR will require significant expenditures from farmers, wetland operators, and municipal dischargers. Estimates of the implementation costs for non point source dischargers range from 15 to 133 million dollars per year depending on which alternative is selected.



Alternative 4, the recommended alternative, is the least expensive alternative to implement because drainage management needs are minimized and allowable discharges to the LSJR are maximized through real-time water quality management. Implementation of Alternative 4 will cost approximately 27 to 38 million dollars per year. Spreading this cost out over the 1.2 million acres of nonpoint source land use in the LSJR watershed results in cost of $23 to $32 per acre per year. The economic analysis indicates that cost to dischargers can be further reduced if dischargers implement re-operation of drainage along with real-time management. Implementation of drainage re-operation should bring the total cost of implementation down to the 15 to 21 million dollar a year range or $13 to $18 per acre per year.

The current cost of agricultural production in the LSJR watershed is approximately 2.2 to 3.1 billion dollars per year. These costs include the cost for land (either interest on debt

repayment or rent), equipment, irrigation, water, planting, land preparation, application of fertilizers, pest management, harvesting costs, and others. The cost to implement Alternative 4a (real-time management without re-operation) would amount to an estimated 1 to 1.4 percent increase in the current cost of agricultural production in the entire LSJR watershed. While this cost increase may seem relatively modest, it is important to note that this is just the cost to implement one control program. Farmers may be faced with additional costs in the near future to implement other control programs for the control of pesticides, oxygen demanding substances, and other pollutants. Costs to implement controls for other pollutants may be additive or there may be overlap in the control programs. For example, the control of pesticide runoff in the irrigation season may in large part already be achieved through control of drainage runoff in this salinity control program. The additive or overlapping costs of the various control programs will be considered, as needed, as each new program is proposed and evaluated.

Furthermore, information provided in University of California Cooperative Extension (UCCE) Costs and Returns Studies indicate that some of the major crops grown in the LSJR are not profitable because costs often exceed revenues. Adding additional costs to marginally profitable or unprofitable agricultural operations could be detrimental to agricultural interests in the LSJR watershed.

Agricultural profitability in the San Joaquin Valley and elsewhere is extremely sensitive to many factors including commodity prices. Almond production in the San Joaquin illustrates this sensitivity. According to information from UC Cooperative Extension cost and return studies (UCCE, 2002a and UCCE 2002b), the average annual cost to produce almonds in the San Joaquin Valley is approximately $2,879 per acre. According to the same studies, the typical yield for San Joaquin Valley almonds is 2,000 lbs per acre and the average market commodity price in 2002 was $1.25/lb. This represents a cost of $2,879 per acre, revenue of $2,500 per acre, and a net loss of $379 per acre. Since there are approximately 230 thousand acres of almonds in the LSJR TMDL project area this is a net loss of approximately $87 million dollars per year for almonds alone. According to an 8 April 2004 article in the Western Farm Press, however, prices for nonpareil supreme almonds were “above $2.25 per pound in the wake of strong world demand” (Western Farm Press, 2004). Using a unit price of $2.25 per pound for almonds and the same costs provided in the UC cost and return studies, losses of $87 million dollars per year are transformed into profits of $373 million dollars per year in the LSJR watershed. By comparison, the cost of the proposed control program would be approximately 5 to 7 million dollars per year for almond growers in the LSJR watershed (230 thousand acres at $23 to $32 per acre).

As illustrated in the example above, many factors that influence agricultural viability are beyond the control of the Regional Board. Determination of the long-term effects of this control program on agricultural production (i.e. taking land out of production) is therefore beyond the scope of this analysis. A detailed economic analysis of the effect of agricultural drainage control on long term agricultural viability was completed in 1987, however, as part of the State Water Board’s Order No. WQ 85-1 Technical Committee Report for Regulation of Agricultural Drainage to the San Joaquin River. The report,

which analyzed cost impacts associated with drainage controls in the Grassland Bypass Project service area (Drainage Service Area), found that "it requires a cost increase of about $35/acre before any land goes out of production in the long run" (SWRCB, 1987). A cost of $35 per acre in 1987 represents a cost of approximately $58 per acre in 2004 dollars. At an estimated $23 to $32 per acre, the proposed control program's cost is below the threshold cost identified in the State Water Board's Order No. WQ 85-1 Technical Committee Report for prompting agricultural land to be taken out of production.

Though less expensive options may be available, costs to municipal and industrial dischargers are estimated to be approximately $6.3 millions dollars per year if micro-filtration reverse osmosis treatment is used to meet waste load allocations. Total costs for compliance for meeting waste load allocations and load allocations are estimated to be approximately 33 to 44 million dollars per year. The cost estimates provided in this analysis are conservative (high) because they are based on relatively expensive methods to control discharges (e.g. reverse osmosis for controlling municipal discharges, evaporation ponds and landfill disposal of salts for agricultural discharges) and higher unit cost estimates have typically been used when multiple treatment cost data were available. It is likely that both municipal and agricultural dischargers can and will develop more cost effective methods to comply with the proposed control program.

6 California Environmental Quality Act (CEQA) Review

The Secretary of Resources has certified the Basin Planning process as meeting the requirements of section 21080.5 of the California Environmental Quality Act (CEQA). As such, documents prepared in connection with the basin plan amendment may be substituted in lieu of an environmental impact report. These documents must include either alternatives to the activity and mitigation measures to reduce any significant or potentially significant effect that the project may have on the environment or a statement that the project would not have a significant impact on the environment. This statement must be supported by a checklist or other documentation which shows the possible effects that were considered when reaching the decision.

The following checklist was prepared in compliance with CEQA requirements and to assist in identifying potential impacts and outlining mitigation measures. The checklist is followed by discussion of each of the 17 categories of impact.

6.1 Environmental Checklist Form

1. Project title

Amendment to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Salt and Boron Discharges to the Lower San Joaquin River Basin.

2. Lead agency name and address

California Regional Water Quality Control Board, Central Valley Region

11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

3. Contact person and phone number

Eric Oppenheimer, Environmental Scientist (916) 464-4844

4. Project location

San Joaquin River Watershed: the San Joaquin River from Friant Dam to the Airport Way Bridge near Vernalis

5. Project sponsor's name and address

California Regional Water Quality Control Board, Central Valley Region
11020 Sun Center Drive #200
Rancho Cordova, CA 95670-6114

6. General plan designation

Not applicable

7. Zoning

Not applicable

8. Description of project

The Regional Board is proposing to amend the Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. The purposes of the proposed amendment are 1) to add methods to calculate salt load limits for land areas that discharge to the San Joaquin River from Mendota Dam to the Airport Way Bridge near Vernalis and 2) to adopt an implementation strategy to achieve these load limits.

9. Surrounding land uses and setting

The areas impacted by this basin plan amendment include the San Joaquin River watershed downstream of Friant Dam and upstream of the Airport Way Bridge near Vernalis. The watershed boundary, clockwise from the Airport Way Bridge, follows the Stanislaus River to Caswell Park. From Caswell Park, the boundary follows a ridgeline north to the fork of the Main District Canal east of Ripon and on to the South San Joaquin Main Canal to the intersection with Woodward Reservoir. The boundary continues along the drainage divide between Woodward Reservoir and Littlejohns Creek, and then along the South San Joaquin Main Canal, and the North Main Canal. Just past the intersection of North Main Canal and Littlejohns Creek, the boundary follows the divide between the San Joaquin Main Canal and Littlejohns Creek to the Stanislaus County line. The east boundary of the watershed follows the eastern edge of the Stanislaus and Merced County lines. Where the Merced County line meets the Madera County line, the boundary follows the CALWATER boundary to the San Joaquin River at Friant Dam. The southern boundary of the watershed follows the San Joaquin River from Friant Dam to the Mendota Pool. Here the boundary follows the southern edge of CALWATER RBUASPW areas 6541200000 (Los Banos Hydrologic Area), 6542410504, 6542410502, and 6542410503, west to the Fresno/San Benito County line. From here, the western

boundary of the watershed follows the crest of the Coast Range along the Fresno, Merced, and Stanislaus county lines. The northern boundary continues along the north side of Hospital and Lone Tree Creeks and continues along the northern edge of CALWATER 6564100000 (Patterson Hydrologic Area), and then follows the gas line running northeast across the Vernalis Gas Fields, coincident with the angle of Airport Way, to the San Joaquin River at the Airport Way Bridge. (see Appendix B for additional information)

The land uses in the area include agriculture, wetlands, and urban.

10. Other public agencies whose approval is required

State Water Resources Control Board
Office of Administrative Law
U.S. Environmental Protection Agency

EVALUATION OF ENVIRONMENTAL IMPACTS

This Environmental Checklist has been prepared in compliance with the requirements of CEQA relating to certified regulatory programs.

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
I. AESTHETICS Would the Project:				
a) Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☒
b) Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☒
c) Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☒
d) Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☒
II. AGRICULTURE RESOURCES: In determining whether impacts to agricultural resources are significant environmental effects, lead agencies may refer to the California Agricultural Land Evaluation and Site Assessment Model (1997) prepared by the California Department of Conservation as an optional model to use in assessing impacts on agriculture and farmland. Would the Project:				
a) Convert Prime Farmland, Unique Farmland, or Farmland of Statewide importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use?	☐	☐	☐	☒
b) Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☒
c) Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland, to non-agricultural use?	☐	☐	☐	☒
III. AIR QUALITY – Where available, the significance criteria established by the applicable air quality management or air pollution control the District may be relied upon to make the following determinations. Would the Project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☐	☒
b) Violate any air quality standard or contribute substantially to an existing or projected air quality violation?	☐	☐	☐	☒
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the Project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions which exceed quantitative thresholds for ozone precursors)?	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☒
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☒
IV. BIOLOGICAL RESOURCES – Would the Project:				
a) Have a substantial adverse effect, either directly, or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulators, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☒	☐	☐
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, regulations or by the California Department of Fish and Game or US fish and Wildlife Service?	☐	☒	☐	☐
c) Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☒	☐	☐
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☒
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☒
f) Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☒
V. CULTURAL RESOURCES – Would the Project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☒
b) Cause a substantial adverse change in the significance of an archaeological resource pursuant to §15064.5?	☐	☐	☐	☒
c) Directly or indirectly destroy a unique paleontological resource of site or unique geological feature?	☐	☐	☐	☒
d) Disturb any human remains, including those interred outside of formal cemeteries?	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
VI. GEOLOGY AND SOILS – Would the Project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☒
i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.	☐	☐	☐	☒
ii) Strong seismic ground shaking?	☐	☐	☐	☒
Iii) Seismic-related ground failure,, including liquefaction?	☐	☐	☐	☒
iv) Landslides?	☐	☐	☐	☒
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☒
c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the Project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☒
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☒
VII. HAZARDS AND HAZARDOUS MATERIALS – Would the Project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials?	☐	☐	☐	☒
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☒
c) Emit hazardous emissions or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☒
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?	☐	☐	☐	☒
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
f) For a Project within the vicinity of a private airstrip, would the Project result in a safety hazard for people residing or working in the Project area?	☐	☐	☐	☒
g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☒
h) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☒
VIII. HYDROLOGY AND WATER QUALITY – Would the Project:				
a) Violate any water quality standards or waste discharge requirements?	☐	☐	☐	☒
b) Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g., the production rate of preexisting nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted?	☐	☐	☐	☒
c) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?	☐	☐	☐	☒
d) Substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which results in flooding on- or off-site?	☐	☐	☐	☒
e) Create or contribute runoff water which exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☒
f) Otherwise substantially degrade water quality?	☐	☐	☐	☒
g) Place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?	☐	☐	☐	☒
h) Place within a 100-year flood hazard area structures which would impede or redirect flood flows?	☐	☐	☐	☒
i) Expose people or structures to a significant risk of loss, injury or death involving flooding,	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
including flooding as a result of the failure of a levee or dam?				
j) Inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☒
IX. LAND USE AND PLANNING – Would the Project:				
a) Physically divide an established community?	☐	☐	☐	☒
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project (including, but not limited to the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☒
c) Conflict with any applicable habitat conservation plan or natural community conservation plan?	☐	☐	☐	☒
X. MINERAL RESOURCES – Would the Project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☒
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☒
XI. NOISE – Would the Project result in:				
a) Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☒
b) Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☒
c) A substantial permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☐	☐	☒
d) A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above levels existing without the Project?	☐	☐	☐	☒
e) For a Project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
f) For a Project within the vicinity of a private airstrip, would the Project expose people residing or working in the Project area to excessive noise levels?	☐	☐	☐	☒
XII. POPULATION AND HOUSING – Would the Project?				
a) Induce substantial population growth in an	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
area, either directly (for example, by proposing new homes and businesses) or indirectly (for example, through extension of roads or other infrastructure)?				
b) Displace substantial numbers of existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
c) Displace substantial numbers of people, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☒
XIII. PUBLIC SERVICES				
a) Would the Project result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered governmental facilities, the construction of which could cause significant environmental impacts in order to maintain acceptable service ratios, response times or other performance objectives for any of the public services:				
Fire protection?	☐	☐	☐	☒
Police protection?	☐	☐	☐	☒
Schools?	☐	☐	☐	☒
Parks?	☐	☐	☐	☒
Other public facilities?	☐	☐	☐	☒
XIV. RECREATION				
a) Would the Project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☒
b) Does the Project include recreational facilities or require the construction or expansion of recreational facilities which might have an adverse physical effect on the environment?	☐	☐	☐	☒
XV. TRANSPORTATION/TRAFFIC – Would the Project:				
a) Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio to roads, or congestion at intersections?	☐	☐	☐	☒
b) Exceed, either individually or cumulatively, a level of service standard established by the county congestion/management agency for designated roads or highways?	☐	☐	☐	☒
c) Result in a change in air traffic patterns,	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
including either an increase in traffic levels or a change in location that results in substantial safety risks?				
d) Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)?	☐	☐	☐	☒
e) Result in inadequate emergency access?	☐	☐	☐	☒
f) Result in inadequate parking capacity?	☐	☐	☐	☒
g) Conflict with adopted policies, plans, or programs supporting alternative transportation (e.g., bus turnouts, bicycle racks)?	☐	☐	☐	☒
XVI. UTILITIES AND SERVICE SYSTEMS – Would the Project?				
a) Exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board?	☐	☐	☐	☒
b) Require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
c) Require or result in the construction of new storm water drainage facilities or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☒
d) Have sufficient water supplies available to serve the Project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☒
e) Result in a determination by the wastewater treatment provider which serves or may serve the Project that it has adequate capacity to serve the Project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☒
f) Be served by a landfill with sufficient permitted capacity to accommodate the Project's solid waste disposal needs?	☐	☐	☐	☒
g) Comply with federal, state, and local statutes and regulations related to solid waste?	☐	☐	☐	☒
XVII. MANDATORY FINDINGS OF SIGNIFICANCE				
a) Does the Project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☒

IMPACT	POTENTIALLY SIGNIFICANT IMPACT	POTENTIALLY SIGNIFICANT UNLESS MITIGATION INCORPORATION	LESS THAN SIGNIFICANT IMPACT	NO IMPACT
b) Does the Project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probably future projects)?	☐	☐	☐	☒
c) Does the Project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly?	☐	☐	☐	☒

THRESHOLDS OF SIGNIFICANCE

For the purposes of making impact determinations, potential impacts were determined to be significant if the proposed project, or its alternatives would result in changes in environmental condition that would, either directly or indirectly, cause a substantial loss of habitat or substantial degradation of water quality or other resources.

6.2 Discussion of Environmental Impacts

Analysis of potential environmental impacts is based on possible changes to water and drainage management practices to comply with the proposed regulations. Potential practices are described in Section 4.4.2 and Appendix 2. Expanded discussion is included only for checklist questions answered Potentially Significant Impact, Less than Significant with Mitigation Incorporation, or Less than Significant Impact.

I. Aesthetics

Possible changes to water and drainage management practices by agricultural and wetland dischargers to comply with the proposed regulations would not alter any scenic vistas, damage scenic resources, degrade the visual character of any site, or adversely affect day or nighttime views.

II. Agricultural Resources

The project would not convert farmland to non-agricultural uses as no changes to land use designations are being sought. Agricultural dischargers may use a variety of water and drainage management practices, discussed in Section 4.4.2 and Appendix 2, or other potential strategies to comply with the proposed Basin Plan Amendment. Such practices are unlikely to lead to conversion of farmland to non-agricultural uses, though some agricultural dischargers may choose to use agricultural lands to reuse, store, or treat recycled drainage water. Any facilities constructed to comply with the provisions of the proposed Basin Plan Amendment are considered as appurtenant to agricultural operations and therefore an agricultural use. Furthermore, agricultural dischargers have a wide range of options available to comply with the proposed Basin Plan Amendment. Management practices employed to comply with the proposed Basin Plan

Amendment may occur at the farm scale, district scale, or basin-wide scale. Specific projects implemented to comply with the proposed regulation would need to be evaluated by the implementing entity, as necessary.

Costs to dischargers have been minimized through selection of the most cost effective implementation alternative in section 4.4.8. The recommended alternative requires the least amount of drainage treatment (except for the no action alternatives-which has been determined to be inconsistent with the goals of the project), this should minimize the burden to farmers and any potential effects on agriculture. Specifically, the proposed control program provides flexibility to agricultural dischargers by allowing dischargers to comply with real-time load allocations, and encourages the use of pollutant trading to meet load allocations. Additionally, supply water credits are provided to dischargers that receive elevated salt in their water supply. These supply water credits reduce the economic and operational impacts of the control program on irrigators that receive a degraded (higher salinity) water supply. The compliance time schedule ranges from 8 to16 years for dry through wet year types, and is extended to 12 to 20 years for critically dry year types. This allows time for farmers to develop cost effective implementation strategies that have the lowest possible impact on agricultural productivity and the least agricultural costs. Furthermore, the availability of federal and state government funds for environmental conservation (e.g., EQIP, Proposition 13 and Proposition 50 funds) should allow growers to offset some of their costs, if they choose an approach that requires a greater capital investment. Although no direct impacts to agricultural resources have been identified, the mitigation described above has been included in the proposed control program to reduce potential impacts to agricultural resources.

III. Air Quality

Possible changes to water and drainage management practices would not have any effect on air quality.

IV. Biological Resources

Compliance with load allocations would likely result in a reduction in wetland and agricultural drainage returns flows to the LSJR. The most pronounced reduction in drainage return is expected during low-flow conditions when the assimilative capacity of the LSJR is lowest. Agricultural return flows make up a large fraction of the total flow in Mud Slough, Salt Slough and the LSJR upstream of the Merced River during low-flow conditions. A reduction in return flows would exacerbate the impacts of low-flow conditions in certain agricultural ditches, sloughs, and reaches of the LSJR. Decreased flow during low-flow conditions may result in a number of adverse impacts, including a reduction in the wetted perimeter of affected reaches. These impacts could reduce the quantity of habitat for aquatic and riparian-dependent organisms, which include a number of potentially affected state and federally-listed special status species (e.g., Giant Garter Snake, California Red-Legged Frog, Western Yellow-Billed Cuckoo, Bald Eagle, Swainson's Hawk) (USBR, 2002). This impact would be reduced

downstream of the Merced, Tuolumne, and Stanislaus River confluences with the LSJR as agricultural drainage becomes an increasingly smaller percent of LSJR flow.

Portions of the TMDL project area are located within the known range of the Fall/Late Fall-run Chinook Salmon; however, adverse impacts to this federal candidate species (also a state Species of Concern) are not expected as a result of the proposed project. According to National Marine Fisheries Service Chinook Listing Status Maps (1999), the drainage areas of Mud Slough, Salt Slough and the LSJR upstream of the Merced River are not located within the current known range of the species. In fact, the California Department of Fish and Game actually installs barriers on the LSJR near the mouth of the Merced River to route Fall-run Chinook Salmon up the Merced River during the spawning season (USBR, 2000).

Potentially significant impacts resulting from reduced return flows have been identified above. There are a number of factors unrelated to this project, however, that have a greater influence on return flows to the LSJR.

Agricultural return flows are largely a function of the acreage of the area drained and volume of applied water. During droughts, less water is applied to a smaller area, and as a result the volume of drainage generated and eventually returned to the LSJR is reduced. Periods of drought correspond to the lowest flow conditions in Mud Slough, Salt Slough, and the LSJR. In the case of droughts or drier water years, return flows to the LSJR would be substantially reduced even in the absence of the proposed project.

There are a number of planned and ongoing projects or activities that will also act to reduce the volume of drainage to the LSJR. For example, an existing TMDL for selenium in the LSJR is being implemented through a waste discharge requirement on the Grassland Bypass Project. The waste discharge requirements impose load allocations for selenium discharges from the San Luis Drain, which is major source of flow to Mud Slough during the irrigations season. Implementation of selenium load allocations already results in decreased flow in Mud Slough. It is important to note, however, that selenium is a trace mineral (commonly found in subsurface drainage from the west side of LSJR watershed) that can be toxic to fish and wildlife.

The USBR's San Luis Drainage Feature Reevaluation Project (USBR, 2001, USBR, 2002) is another ongoing program that will potentially affect the quantity and quality of agricultural drainage returns to the LSJR. The USBR has a legal obligation to provide drainage to an 81,000-acre drainage-impacted area within the Grassland Subarea known as the Grassland Drainage Area (GDA). Subsurface drainage from the Grassland Subarea is the principal source of flow in the San Luis Drain. The USBR is currently evaluating 3 options for providing drainage to the GDA. All three options involve capture and redirection of the

agricultural drainage originating from the GDA. The San Luis Drainage Feature Reevaluation Project will therefore result in a reduction of flow to Mud Slough and the LSJR even if the proposed control program is not implemented.

The proposed project, the selenium TMDL, the San Luis Feature Reevaluation Project, and ongoing voluntary efforts by farmers and wetland operators are all expected to result in a reduction of irrigation return flows to the LSJR. As discussed above, there are potential adverse impacts associated with reduced flows. The potential flow-related effects of these ongoing and planned projects are overlapping rather than cumulative since each project could reduce the same drainage sources. The potential adverse impacts of reduced flows are partially offset by the environmental benefit of removing agricultural drainage from the LSJR. Agricultural drainage is one of the largest pollution sources in the LSJR watershed. Both this proposed project and the selenium TMDL have been designed to protect or restore the beneficial uses of the LSJR, including irrigation supply, domestic supply, and fish and wildlife habitat.

Agricultural water conservation practices and out-of-basin water transfers greatly influence the quantity and quality of return flows to the LSJR. Water conservation practices involve a reduction in the amount of water applied to crops that makes water available for other uses (including expansion of crop acreage). Implementation of water conservation practices results in decreased drainage returns. Water supplies made available through water conservation is frequently used as justification to transfer water to an out-of-basin use; this action removes water from the LSJR watershed. These out-of-basin water transfers usually involve an economic benefit to the water rights holder who transfers the water. The proposed project may prompt dischargers to implement water conservation practices specifically to reduce drainage to comply with load allocations. A portion of the water made available though implementation of water conservation practices could be used to increase the assimilative capacity of the LSJR (increase flow) or for other environmental purposes. As part of the proposed project, the Regional Board will work with the State Water Board to ensure that out-of basin water transfers do not have a deleterious effect on the LSJR and to the extent possible, identify and act on opportunities to provide increased flow to the LSJR.

Possible changes to water and drainage management practices applied to managed wetlands would likely have an effect on the management of federally protected wetlands. State, federal, and privately managed wetlands will need to adopt water management practices that may include changes in the timing of discharges of ponded wetland water. The mix of habitat types within wetland complexes may need to be changed to reflect changes in the timing of wetland draw down to meet load. Proposed changes to wetland operations or the construction of new facilities would be subject to a separate CEQA analysis by the appropriate lead agency.

Four alternatives were considered in the development of the proposed control program. The no action alternative was determined to be inconsistent with goals

of the project, as it will not result in water quality improvement. Of the remaining three alternatives, the alternative with the least potential to reduce flows (potentially affecting biological resources) was selected. Though no direct impacts on biological resource have been identified, mitigation has been incorporated in the proposed control program to reduce potentially significant effects on biological resources. The recommended alternative includes mitigation since it allows and encourages the use of real-time management, instead of more conservative fixed base load allocations, as a mechanism to achieve water quality objectives. Real-time management requires dischargers to manage saline discharges and freshwater flows based on real-time conditions, thereby reducing the need to retain drainage. The recommended alternative will therefore result in the smallest potential reduction in LSJR and tributary flows and therefore the least potential to adversely affect biological resources. Additionally, by allowing dilution flow to be used to increase assimilative capacity, the control program encourages increased flow of lower salinity water in the LSJR and its tributaries. The proposed control program also includes policy statements that recommend that the Sate Water Board continue to use its authority to condition water rights on the attainment of existing and new water quality objectives. The State Water Board has already conditioned water rights of the USBR on attainment of salinity water quality objectives in the SJR near Vernalis. To the extent that this salinity control program could result in reduced flows, these water rights may need to be further conditioned by the State Water Board.

V. Cultural Resources

Implementation of the proposed Basin Plan Amendment would not likely to affect cultural resources.

VI. Geology and Soils

Implementation of the proposed Basin Plan Amendment would not affect the geology of the region and would not expose people to additional geologic hazards. Water and drainage management practices implemented by agricultural dischargers to comply with the proposed regulation may, in fact, reduce soil erosion and loss of topsoil that is occurring in the project area.

VII. Hazards and Hazardous Materials

Implementation of the proposed Basin Plan Amendment would not create hazards or affect handling of hazardous materials.

VIII. Hydrology and Water Quality

The purpose of the proposed Basin Plan Amendment is implementation of a program to comply with existing water quality objectives through reduction and changes in timing of salt and boron loading to the San Joaquin River. It is anticipated that management practices employed by agricultural and wetland dischargers to comply with the proposed regulations would, in fact, result in improved water quality with regard to salinity and boron concentrations.

Implementation of the proposed Basin Plan Amendment is not likely to result in violation of water quality standards or waste discharge requirements or deplete groundwater supplies. Changes in the timing of discharges to the San Joaquin River by agricultural and wetland dischargers may alter existing flow patterns but they are unlikely to result in erosion, siltation, or flooding. Implementation of the proposed regulation is unlikely to affect stormwater drainage systems, provide additional sources of polluted runoff, substantially degrade water quality, have an effect on flood flows, or increase the chance of inundation by seiche, tsunami, or mudflow.

Management practices employed to comply with the proposed Basin Plan Amendment may occur at the farm, district, or basin-wide scale. Specific projects implemented to comply with the proposed regulation would need to be evaluated for its effects on hydrology and water quality by the implementing entity, as necessary.

Drainage re-use could potentially have an effect on groundwater resources. Operation of new drainage re-use facilities would likely result in increased percolation and groundwater recharge and therefore not adversely affect the production rate of any nearby wells. Drainage re-use, however, has the potential to adversely effect groundwater quality though surface water application and resulting percolation of high salinity drain water, and through leaching of minerals from the soil profile. Construction and use of evaporation ponds could have a similar impact on groundwater quality if they are not properly designed. Background information on groundwater resources in the LSJR watershed is given in Appendix A (Section 1.3 of the technical TMDL report). In general, Groundwater quality is poorer on the west side of the LSJR compared to the east side, and in many areas the groundwater currently exceed secondary drinking water MCLs for salinity.

The Grassland Subarea contains some of most salt-affected lands in the LSJR watershed. This subarea is also the largest contributor of salt to the LSJR (approximately 37% of the LSJR's mean annual salt load). Previous studies indicate that shallow groundwater in the LSJR watershed is of the poorest quality (highest salinity) in the Grassland Subarea (SJVDP, 1990). As mentioned above , the USBR has a legal obligation to provide drainage GDA. The USBR's San Luis Drainage Feature Re-evaluation Plan Formulation Report (2002) indicates that their In-valley Disposal Alternative (which calls for drainage reduction through re-use and other means) would "*... have a beneficial impact on groundwater salinity relative to the no-action alternative*" (cessation of drainage by 2010). Additionally, an existing TMDL for selenium and its implementing WDR establishes progressively stricter load limits for drainers in the GDA. Therefore, drainage re-use and evaporation facilities in some form, will likely be used by dischargers, in cooperation with the USBR, to address ongoing drainage issues in the Grassland Subarea independent of this Basin Plan Amendment.

Potential impacts to groundwater quality have been minimized by selecting the implementation alternative that allows the maximum amount of drainage to be discharged to the river, thereby reducing the amount of drainage that needs to be re-used or evaporated. Additional mitigation can be incorporated into the design of re-use facilities to minimize or eliminate potential impacts to groundwater quality. Placement of shallow tile drains, for example, below re-use facilities can be used to intercept and isolate high percolating drainage before reaching underlying aquifers. Any evaporation and re-use facilities constructed to comply with proposed regulation would be designed and permitted to minimize impacts on groundwater resources. The proposed regulation does not authorize the construction of any new re-use or evaporation facilities and any such projects would be subject to a separate CEQA analysis by the appropriate lead agency. The proposed Basin Plan Amendment would therefore not have a substantial impact on groundwater quality.

IX. Land Use and Planning

Implementation of the proposed Basin Plan Amendment should not result in any changes in land use or planning (see section II above for discussion of Agricultural Resources).

X. Mineral Resources

Implementation of the proposed Basin Plan Amendment should have no effect on mineral resources.

XI. Noise

Agricultural and wetland dischargers would likely make changes to their water and drainage management practices to comply with the proposed regulations. These practices, such as those described in Appendix 2 should not lead to any increase in exposure to noise

XII. Population and Housing

Implementation of the proposed Basin Plan Amendment would not directly or indirectly induce population growth in the area, displace existing housing, or displace people.

XII. Public Services

The proposed Basin Plan Amendment would not have an impact on public services.

XIV. Recreation

There should be no increase in use of parks or recreational facilities or the need for new or expanded recreational facilities as a result of this proposed Basin Plan Amendment.

XV. Transportation/Traffic

The proposed Basin Plan Amendment would not have an impact on transportation or traffic.

XVI. Utilities and Service Systems

The proposed Basin Plan Amendment includes limits on loads of salt and boron from wastewater treatment plants. Load limits from wastewater treatment plants are set at current loading rates so the proposed regulation would not require or result in the construction of new water or wastewater treatment facilities or expansion of existing facilities. Agricultural and wetland dischargers, in order to comply with the proposed regulations, may chose to treat or dispose of drainage water. Agricultural and wetland dischargers would be responsible for the construction and assessment of the environmental impacts of any treatment systems.

XVII. Mandatory Findings of Significance

The purpose of the proposed Basin Plan Amendment is to implement existing water quality objectives through load reductions and changes in timing of discharge of salt and boron. Implementation of the proposed Basin Plan Amendment would therefore likely result in improved quality of the environment with respect to reduced salt and boron concentrations in the San Joaquin River. Future Basin Plan Amendments will establish new water quality objectives for salt and boron, at which time additional salt and boron load reductions will be required. Other Basin Plan Amendments will likely establish new water quality objectives for other pollutants such as pesticides and other control programs to comply with new or existing objectives. The cumulative impacts of these additional regulations will be evaluated at the time of these future Basin Plan Amendments.

CEQA Summary

The salt and boron water quality impairment in the LSJR has occurred, in large part, as a result of large-scale water development coupled with extensive agricultural land use and associated agricultural discharges in the watershed. LSJR flows have been severely diminished by the construction and operation of dams and diversions and the resulting consumptive use of water. Most of the natural flows from the Upper San Joaquin River (SJR) and its headwaters are diverted at the Friant Dam via the Friant-Kern Canal to irrigate crops outside the SJR Basin. Diverted natural river flows have been replaced with poorer quality (higher salinity) imported water from the Sacramento-San Joaquin Delta (Delta) that is primarily used to irrigate crops on the west side of the LSJR basin. Surface and subsurface agricultural discharges are the largest sources of salt and boron loading to the LSJR; and river water quality is therefore heavily influenced by irrigation return flows during the irrigation season. Agricultural beneficial uses in the LSJR, downstream of the Airport Way Bridge near Vernalis, are adversely impacted by the poor quality of LSJR water. Municipal and agricultural beneficial uses are also potentially adversely impacted due to the contribution of LSJR water to the State and federal water

projects in the Delta. The Delta supplies drinking water for 22 million people and irrigation supply to approximately seven million acres of irrigated land.

In the 1995 *Water Quality Control Plan for the San Francisco Bay/Sacramento San Joaquin Delta Estuary* (Bay Delta Plan), the State Water Board adopted salinity WQOs for the LSJR at the Airport Way Bridge near Vernalis. The salinity water quality objective was established to protect the most salt sensitive beneficial uses of the LSJR, which include irrigation and municipal supply. The State Water Board implemented the salinity water quality objective primarily through Water Right Decision 1641 (D-1641) which in part, conditioned the USBR's water rights on attainment of salinity water quality objectives at the Airport Way Bridge near Vernalis. Despite conditions contained in D-1641, salinity remains a long-term water quality problem in the LSJR. The purpose of the proposed control program is to implement, through salt load reductions, the existing salinity WQO established by the State Water Board. No new water quality objectives are proposed.

The Regional Board's Basin Planning process is a certified regulatory program that is exempt from preparing an Environmental Impact Report. As such, the environmental impacts (both direct and indirect) have been analyzed in the supporting staff report completed in lieu of an Environmental Impact Report, per Section 21080.5 of the California Public Resources Code. As required by CEQA, the staff report, which serves as a substitute environmental document, includes a description of the proposed activity with alternatives to the activity, and mitigation measures to minimize significant adverse effects of the activity on the environment.

The proposed control program establishes policies, which will require dischargers to either limit salt discharges to the LSJR or establish a management program that will result in achieving the existing salinity water quality objectives. The regulations do not prescribe a means by which dischargers must comply; it therefore is not possible to evaluate the potential impacts of the individual projects that dischargers will carry out to comply with the proposed regulation. The environmental analysis did not identify any direct impacts on the environment associated with proposed regulation: However, potential impacts have been identified which are associated with actions that dischargers may take to comply with the proposed regulation. Specifically, the environmental analysis identifies potential impacts to biological resources if flows are reduced as a result of a reduction in municipal discharges and irrigation return flows to the LSJR.

Potentially adverse environmental effects have been minimized by selecting the alternative that will provide dischargers with the maximum flexibility to comply with the control program while providing assurance that the salinity water quality objective will be met. By allowing and encouraging dischargers to use real-time load allocations and pollutant trading, the maximum amount of drainage to the LSJR is permitted, which minimizes the potential to reduce or restrict LSJR and tributary flows. Increased flows to the LSJR and its tributaries is also encouraged by allowing discharges to meet load allocations by providing assimilative capacity through dilution. Potential impacts caused by reduced flows (resulting from drainage reductions) can be mitigated further by the

addition of fresh water flows to replace irrigation return flows removed as a result of this control program. The Regional Board does not have authority over water rights decisions and therefore cannot require releases of freshwater flows to mitigate for potentially reduced flows that may occur as a result of the control program. Instead, the proposed regulation includes the following recommendations to the State Water Board, which does have water rights authority:

1. The State Water Board should consider the continued use of its water rights authority to prohibit water transfers if the transfer contributes to low flows and related salinity water quality impairment in the Lower San Joaquin River.

2. The State Water Board should consider the continued conditioning of water rights on the attainment of existing and new water quality objectives for salinity in the Lower San Joaquin River when these objectives cannot be met through discharge controls alone.

Despite potentially significant impacts to biological resources, there is an overriding need to protect the beneficial uses of the LSJR. Additionally, the Regional Board must undertake these actions to comply with the statutory mandates contained in the Porter-Cologne Water Quality Control Act and the Clean Water Act. This control program balances the need to protect the beneficial uses of the LSJR versus the potential adverse environmental effect of reduced flows in the LSJR upstream of Vernalis

7 Public Participation and Agency Consultation

A technical TMDL report was released for public review in January 2002 and staff solicited informal comments from the public and affected agencies at that time. Regional Board staff also held a series four workshops to inform the public and interested parties of the status of the salt and boron TMDL. The workshops included initial outreach to inform stakeholders that this TMDL was being started, and continuous updates were conducted to explain the methods and assumptions used to develop the TMDL. These workshops were held to seek public input regarding the development of the TMDL. Accordingly, the salt and boron technical TMDL was revised several times, prior to its January 2002 release, to address public concerns or incorporate ideas that were suggested at public workshop or in written comments.

Summary of Public Workshops for the San Joaquin River Salt and Boron TMDL

Date	Workshop Subject
August 2000	Initial Outreach for Salt and Boron TMDL
March 2001	Initial Outreach and Overview of the Salt and Boron TMDL
August 2001	Problem Statement, Source Analysis
March 2002	Draft TMDL Report - Loading Capacity Method, Load Allocations, and Waste Load Allocations
September 2003	Implementation Framework
December 2003	Public Workshop at Regional Board meeting
January 2004	Public Workshop at Regional Board meeting-continued
April 2004	Alternate Approaches for development of a Basin Plan Amendment

A revised technical TMDL report and public review staff report was circulated for public comment in November 2003. A 30-day comment period on the technical TMDL and the implementing Basin Plan amendment was provided at that time.

Informational workshops on a draft Basin Plan Amendment for the control of salt and boron discharges into the San Joaquin River were held at the December 2003 and January 2004 Regional Board meetings. During these workshops, the Regional Board directed staff to hold an additional public workshop to further discuss and consider public comments prior to Regional Board consideration of the proposed Basin Plan Amendment.

Staff subsequently held a series of small group meetings with interested parties that submitted comments on the November 2003 Public Review Draft TMDL and Basin Plan Amendment. Following theses small group meetings, a facilitated public workshop was held in April 2004 to discuss alternate approaches for a TMDL and Basin Plan Amendment to address salt and boron impairment in the LSJR. At the close of the April 2004 workshop it was decided that staff would respond to comments, revise the proposed Basin Plan Amendment, and proceed with adoption of a proposed Basin Plan Amendment.

The proposed Basin Plan Amendment is scheduled for consideration for adoption by the Regional Board at the 9 and 10 September 2004 Regional Board meeting. A 45 day public noticing and comment period will be provided prior to the hearing to consider adoption.

With regard to agency consultation the State Water Boards CEQA (23 CFR 3778) regulations state that:

> *Upon completion of the written report, the board shall consult with other public agencies having jurisdiction by law with respect to the proposed activity and should consult with persons having special expertise with regard to the environmental effects involved in the proposed activity. The board may consult with such persons by transmitting a copy of the written report or by other appropriate means.*

Agency consultation shall occur when this staff report is circulated for public review and comment. A written response to any comments containing significant environmental points raised during the evaluation process will be prepared and made available to the public pursuant to the regulations at 23 CFR 3779.

8 References

Central Valley Regional Water Quality Control Board (CVRWQCB), 1998. Water Quality Control Plan (Basin Plan) for the Sacramento River and San Joaquin River Basins. California Regional Water Quality Control Board, Central Valley Region.

Central Valley Regional Water Quality Control Board (CVRWQCB), 1996. Amendments to the Water Quality Control Plan for the Sacramento River and San Joaquin River Basins for the Control of Agricultural Subsurface Drainage Discharges. California Regional Water Quality Control Board, Central Valley Region.

Central Valley Regional Water Quality Control Board (CVRWQCB), 2001, Waste Discharge Requirements for the San Luis & Delta Mendota Water Authority and United States Department of the Interior Bureau of Reclamation Grassland Bypass Project (Phase II) Fresno and Merced Counties. Regional Board Order No. 5-01-234. California Regional Water Quality Control Board, Central Valley Region.

Central Valley Regional Water Quality Control Board (CVRWQCB), 2002. Draft Initial Study and Negative Declaration for Conditional Waiver of Waste Discharge Requirements for Discharges from Irrigated Land.

Central Valley Regional Water Quality Control Board (CVRWQCB), 2003. California Regional Quality Control Board Central Valley Region Resolution No. R5-2003-0105. Conditional Waiver of Waste Discharge Requirements for Discharges From Irrigated Lands Within the Central Valley Region.

Grober, L.F. and C.R. Kratzer. 1989. Stochastic Modeling of Water Quality in the San Joaquin River, California, Using Monte Carlo Simulation. Proceedings of the Sixteenth Annual Conference of the ASCE Water Resources Planning and Management Division. May 21-24, 1989, Sacramento, California. Pp. 780-783.

Karkoski, J., Menconi, M., Briggs, K., and G. Davis. 2002. Draft program of implementation report for the control of diazinon in the Sacramento and Feather rivers. California Regional Water Quality Control Board, Central Valley Region staff report. May 2002.

McCarthy, M.J. and L.F. Grober. 2001. Total Maximum Daily Load for Selenium in the Lower San Joaquin River. Staff Report, California Regional Water Quality Control Board, Central Valley Region. Sacramento, California.

Natural Heritage Institute (NHI). 1990. Legal and Institutional Structures for Managing Agricultural Drainage in the San Joaquin Valley: Designing a Future.

National Marine Fisheries Service (NMFS). 1999. Chinook Listing Status Map, Central Valley Fall and Late Fall-Run Chinook Salmon ESU. Can be accessed at:

http://www.nwr.noaa.gov/1salmon/salmesa/chinesum.htm. Accessed: August 28, 2003.

Rashmawi, E.A., L.F. Grober, M.E. Grismer, C.R. Kratzer. 1989. Data Refinements and Modeling Results for the Lower San Joaquin River Basin. University of California, Davis. Land, Air, and Water Resources Department.

San Francisco Estuary Institute (SFEI). 1996. Compliance Monitoring Program for Use and Operation of the Grassland Bypass Project; Section 5.0 Project Management. Can be accessed at: http://www.sfei.org/grassland/. Accessed: April 25, 2002.

San Joaquin Valley Drainage Program (SJVDP), 1990. A Management Plan for Agricultural Subsurface Drainage and Related Problems on the Westside San Joaquin Valley.

State Water Resources Control Board/California Coastal Commission (SWRCB/CCC), 2000. Plan for California's Nonpoint Source Pollution Control Program. Volume I: Nonpoint Source Program Strategy and Implementation Plan 1998-2013. January 2000.

State Water Resources Control Board (SWRCB) 2000. Water Rights Decision 1641. Can be accessed at: http://www.waterrights.ca.gov/BayDelta/d1641.htm. Accessed: August 28, 2003.

State Water Resources Control Board (SWRCB). 1987. Regulation of Agricultural Drainage to the San Joaquin River. Final Report, SWRCB Order No. WQ 85-1 Technical Committee Report, August 1987, Sacramento, California.

UCCE. 2002a. *Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley North, Flood Irrigation*.

UCCE. 2002b. *Sample Costs to Establish an Almond Orchard and Produce Almonds, San Joaquin Valley North, Micro-Sprinkler Irrigation*.

U.S. Bureau of Reclamation (USBR). 2001. San Luis Unit Drainage Feature Re-Evaluation Preliminary Alternatives Report. December 2001.

U.S. Bureau of Reclamation (USBR). 2002. San Luis Drainage Feature Re-Evaluation Plan Formulation Report. December 2002. Sacramento, CA

U.S. Department of Agriculture (USDA), 1999. 1997 Census of Agriculture, AC-97-A-5, California State and County Data, Volume 1, Geographic Area Series, Part 5, Issued March 1999. Pages 170-177. Available at: http://usda.mannlib.cornell.edu/reports/census/ac97aca.pdf Accessed: December 13, 2004.

U.S. Environmental Protection Agency (USEPA). 2002. United States Environmental Protection Agency, Region 5. Major Environmental Laws: Clean Water Act (CWA). Available: http://www.epa.gov/region5/water/cwa.htm. Accessed: August 28, 2003.

University of California Davis (UCD). August 1999. Integrated Economic-Engineering Analysis of California's Future Water Supply: Appendix I Surface Water Hydrology. Available: http://cee.engr.ucdavis.edu/faculty/lund/CALVIN/#Earlier_Reports . Accessed: August 28, 2003.

Wilcox, Nick. Senior Environmental Scientist, State Water Resources Control Board. Sacramento. Telephone Conversation 2003.